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Liquidity and speculative trading: evidence from stock price adjustments to quarterly earnings announcements

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LIQUIDITY AND SPECULATIVE TRADING: EVIDENCE FROM STOCK PRICE ADJUSTMENTS TO QUARTERLY EARNINGS ANNOUNCEMENTS

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Abstract

This dissertation studies whether stock price reactions to quarterly earnings announcements depend on stock liquidity. Baker and Stein (2004) and Scheinkman and Xiong (2003) develop models showing that liquidity can be affected by investor sentiment or speculative trading. With short-sale constraints, liquid stocks have more trading from optimistic, overconfident investors and tend to be overvalued. In this study, we hypothesize that if a liquid stock is overpriced due to intensive speculative trading, the overpricing should be corrected partially or fully after quarterly earnings announcements which convey the information about the fundamental value of stocks and synchronize investors' adjustment to mispricing. Our results show that liquid stocks earn significant lower abnormal returns at the announcements than illiquid stocks. Furthermore, prior to the announcements, liquid stocks also have significant speculative trading. After controlling for other determinants of abnormal returns, we find the return difference between liquid and illiquid stocks during the 12-day earnings announcement period is 4.11%, which is about one-third of the annual liquidity premium. Our findings suggest that the effect of investors' speculative behavior on stock prices is not negligible and that earnings announcements serve as an important mechanism for regulating overpricing caused by speculative trading.

Chapter 1 Introduction

The effect of liquidity on stock returns has been a subject of research for over two decades. In a rational asset pricing framework, investors require a higher return for illiquid stocks than for liquid stocks in order to compensate the extra liquidity risk and transaction costs. Amihud and Mendelson (1986) develop a model which shows that the expected return of an asset increases with the transaction costs and find supportive empirical evidence. Recent studies such as Pastor and Stambaugh (2003), Acharya and Pedersen (2005), and Liu (2006) all suggest that liquidity risk plays an important role in asset pricing. These studies indicate that the liquidity premium is driven by the high required rate of return and low valuation of illiquid stocks. On the contrary, Baker and Stein (2004) and Scheinkman and Xiong (2003) who assume investors are overconfident develop models which show that liquidity can be an indicator of investor sentiment or speculative trading. Liquid stocks have more trading from optimistic overconfident investors and tend to be overvalued. Baker and Stein (2004) and Scheinkman and Xiong (2003) imply that the liquidity premium can also be partially driven by overpriced liquid stocks.

Motivated by Baker and Stein (2004) and Scheinkman and Xiong (2003), this dissertation investigates whether stock price reactions to quarterly earnings announcements depend on stock liquidity. The investigation allows us to assess the importance of speculative trading on liquidity and the role of quarterly earnings announcements in regulating speculative trading. We focus on the revision of the mispricing after quarterly earnings announcements because quarterly earnings announcements provide information about firm

valuation and give investors a chance to correct mispricing. When overconfident investors find the signal they get before the announcement is far from the value revealed in the financial report, they learn that their own information is not as informative as they thought it should be. Therefore, after the announcements, they may perceive their mispricing and correct it. Besides, investors who know the stock is overpriced (underpriced) prior to the announcement may not sell (buy) the stock immediately if they think the magnitude of mispricing will continue increasing for a while. However, expecting the mispricing may be revised after quarterly announcements, they may want to sell (buy) stocks synchronically during the announcement period[1]. Therefore, quarterly earnings announcements can serve as a mechanism for regulating mispricing caused by speculative trading.

In this study, we hypothesize that if liquid stocks are overpriced, right after quarterly earnings announcements they should have lower abnormal returns than illiquid stocks. Our hypothesis depend on two assumptions. First, we posit that investors adjust their mispricing after quarterly earnings announcements. Second, we assume that liquid stocks tend to have more speculative trading by optimistic overconfident investors and are more likely to be overvalued. This assumption is derived from Baker and Stein (2004) and Scheinkman and Xiong (2003). Baker and Stein (2004) develop a model which links liquidity with subsequent stock returns. They show that with short-sale constraints, an increase in liquidity indicates that the market is dominated by overconfident investors whose valuation

[1]Abreu and Brunnermeier (2003) argue that when rational arbitrageurs perceive a bubble, they know the market will eventually collapse. However, if the bubble will not burst soon, they would like to ride the bubble and then sell the bubble asset right before the bubble crashes. To burst the bubble, there must be a sufficient number of arbitrageurs selling the bubble asset at the same time. Because arbitrageurs have different opinions about the timing of the bubble, it is difficult for them to synchronize their sales. As a result, the bubble persists until a synchronizing event which induces a sufficient number of arbitrageurs to sell their assets.

of a stock is higher than its fundamental value. From Baker and Stein (2004), we can infer a positive relation between active trading activities and the overpricing of a stock.

Scheinkman and Xiong (2003) provide a model which directly shows a positive relation between cross-sectional trading activities and a speculative component of stock prices. In their model, investors are overconfident and have different beliefs. When there are short-sale constraints, the ownership of a share of stock gives investors an American-type re-sale option. Expecting to sell their shares in the future to other investors who have more optimistic beliefs (a greater fool), investors are willing to pay a price that is higher than their subjective valuation of the firm's fundamental value. As a result, a speculative component, the difference between the transaction price and the asset's fundamental value, is embedded in the stock price. Scheinkman and Xiong (2003) show that in cross section, when the degree of overconfidence is higher, investors trade more frequently and the speculative component is larger. This indicates that liquidity of stocks is magnified by speculative trading of overconfident investors and that liquid stocks tend to be more overvalued than illiquid stocks.

If liquidity and stock prices are affected by speculative trading and investors adjust their mispricing around quarterly earnings announcements, we should observe a lower return for liquid stocks than for illiquid stocks during the announcement periods. Furthermore, because quarterly earnings announcements are scheduled announcements, investors anticipate the upcoming events before the announcements. During the period right before the announcements, information asymmetry increases. Trading volume decreases because discretionary liquidity traders are unwilling to trade with informed investors and will

postpone their transactions until news release. If the increase in information asymmetry enlarges the differences in beliefs among overconfident investors, in Scheinkman and Xiong's (2003) framework, we should observe more speculative trading during this period. Because liquid stocks tend to have more speculative trading, in this study we also test whether the decrease, if any, in volume for liquid stocks prior to quarterly earnings announcements is lower than the volume decrease for illiquid stocks.

Investigating the announcement effects of about 260,000 quarterly announcements made during 1982-2004 by firms listed in NYSE, AMEX, and NASDAQ, we find evidence supports our hypotheses. The abnormal returns right after quarterly earnings announcements decrease with the liquidity of the stock. The differences of the cumulative abnormal returns between the most liquid stocks and the least liquid stocks is 1.91% and is significant during the 3-day period from day 0 to day 2. This result is robust after we control for book-to-market, analysts' forecast errors, revisions of growth forecasts, analyst forecast dispersions, changes of return volatility, changes of future liquidity, and for changes in risk. Our results also hold well for small and median stocks and for firms with low or median analysts following. For large stocks, however, the differences of the 3-day cumulative abnormal returns between liquid and illiquid stocks are not significant. Because larger firms tend to have less subjective valuation, they are less likely to be affected by investor sentiment than small firms. Therefore, our result is not surprising because large firms are not attractive to speculators. For firms with high analysts following, we also do not find a significant result. Because high-following firms usually have frequent news releases from analysts, which boosts the trading activities, the sample size for high-following illiquid firms is very small.

These firms may suffer from firm-specific problems such as financial distress which deter investors from trading.

Examining the abnormal volume before earnings announcements, we find the trading volume decreases prior to the quarterly earnings announcements. The drop in volume decreases with the liquidity of the stocks. From the path of cumulative abnormal returns and the changes of trading volume during the period from day -10 to day 10, we find evidences of speculative trading for the liquid stocks. Their cumulative abnormal returns increase significantly prior to the announcements but decrease significantly after announcements. Because we do not observe the same pattern for illiquid stocks and the decrease in trading volume prior to the announcements for liquid stocks is lower than illiquid stocks, the result indicates that before the announcements, speculative trading occurs more frequently for liquid stocks. This pattern of speculative trading holds particularly for small, growth, high-forecast-dispersion, low-analyst-following stocks, which supports Baker and Wurgler (2006).

In the further analysis of the different announcement effects on liquid and illiquid stocks, we find liquidity premium realized during the 12-day announcement period is 5.54%. It is about 45.6% of the annual liquidity premium. The liquidity risk or transaction cost story alone seems not enough to explain why 45.6% of annual liquidity premium is realized during only 12 days of the year. Because the liquidity premium realized around quarterly earnings announcements may also reflect differences of information content between the announcements of liquid firms and announcements of illiquid firms, we construct a regression of cumulative abnormal returns on the measure of liquidity as well as information

content of the announcements and other firm characteristics. We find the coefficient of the liquidity measure is significant. After controlling for possible factors of abnormal returns around quarterly earnings announcements, we still find about 4.11 % premium per year (about one-third annual liquidity premium) occurs during the 12-day announcement period. Again the magnitude is not trivial. These results indicate that liquidity premium can be partially driven by the speculative trading from overconfident investors.

This study is related to several empirical studies which show the relation between trading activities and stock returns. Johnson, Lei, Lin, and Sanger (2006) show the effect of the time-series changes of volume on stock returns. The focus of this study is different from that of Johnson, Lei, Lin, and Sanger (2006) in that we study the different response to quarterly earnings announcements between liquid and illiquid stocks and show the relation between cross-sectional differences of trading activities and stock returns. Lee and Swaminathan (2000) also provide the abnormal returns for high-volume and low-volume stocks around earnings announcements and argue that higher future returns experienced by low volume stocks are related to investor misperceptions about future earnings. Here we investigate whether speculative trading, in addition to investors' misperceptions about future earnings, affects announcement returns and trading volume around earnings announcements. We control the misperceptions documented by Lee and Swaminathan (2000) and test whether stocks with high trading activities have speculative trading and low announcement returns. Piqueira (2006) tests whether liquid stocks are overvalued based on monthly cross-sectional regressions of returns on lagged trading activities as well as other control variables. In this study, we focus on the revision of mispricing and speculative

trading around quarterly earnings announcements. Frazzini and Lamont (2006) link trading volume during past earnings announcement periods with the returns of the subsequent announcements; while we use the cross-sectional liquidity at the end of June each year as a measure of speculative trading and test the relation between speculative trading and the announcement returns during the following year.

Our findings contribute to the debate on whether investors' behavior affects stock prices. First, we document significant speculative trading on liquid stocks but not on illiquid stocks. Second, we find a non-trivial magnitude of the perceived liquidity premium resulted from non-fundamental non-risk factors realized during quarterly earnings announcements. This indicates that earnings announcements do serve as an important mechanism for revising overpricing caused by speculative trading. The evidence that speculative trading by overconfident investors affects stock prices suggests that incorporating investors' speculative behavior into an asset pricing model is a promising area for future research.

The rest of this dissertation proceeds as follows. Chapter 2 reviews literatures related to this study. Chapter 3 presents the empirical predictions. In chapter 4, we briefly describe the sources of data, research design, and sample characteristics. The empirical results are shown in chapter 5. Chapter 6 concludes.

Chapter 2 Literature Review

This dissertation investigates whether stock price reactions to quarterly earnings announcements depend on stock liquidity. The investigation allows us to assess the importance of speculative trading on liquidity and the role of quarterly earnings announcements in regulating speculative trading. We argue that quarterly earnings announcements provide information about firms' fundamental value to the public and thus give investors a chance to review the precision of their own information. Furthermore, the announcements provide possible timing for investors who know the overpricing (underpricing) to synchronize their revisions and generate a sufficient selling (buying) force to correct the mispricing. Therefore, if liquid stocks are overpriced due to intensive speculative trading, its abnormal return should be lower than illiquid stocks right after the quarterly announcements. In this chapter, we review related literature. We first review the role of liquidity under the rational asset pricing framework. Then we go on to the framework with the existence of irrational investors. We focus on the effects of irrational behavior on liquidity and stock returns. In the last section, we review papers related to the changes of liquidity during quarterly earnings announcements, the particular period we are interested in.

2.1 Liquidity, Risk, and Stock Return

2.1.1 Dimensions of Liquidity

Liquidity is usually referred to the ability to buy or sell an asset quickly at low cost without much change in value. The standard asset pricing model usually assumes that market is perfect. Under this assumption, liquidity does not affect asset prices. However,

because the market is not frictionless, illiquid stocks are usually associated with high transaction costs, less information available, and great difficulty in executing orders. As a result, investors usually require a higher return for illiquid stocks.

From the definition of liquidity, there are four dimensions of liquidity: trading cost, price impact, trading volume, and trading speed.

Trading cost: When the trading cost of a stock is higher, the liquidity of that stock is lower. Amihud and Mendelson (1986) develop a model which shows the effect of the bid-ask spread on asset pricing. In their model, investors who buy an asset expect to sell it and pay transaction costs in the future. Therefore, the stock price is the expected present value of all future dividends minus the expected present value of all future transaction costs. Their model predicts that the expected return of an asset increases with the transaction cost. Using data over the period 1961-1980 for NYSE stocks, they find high-spread stocks earn higher returns than low-spread stocks after controlling for firm size and market risk, which is consistent with the prediction of their model.

Price impact: Price impact is the change of price caused by a trade. When a stock shows a higher price impact, it is more illiquid. Using ISSM data in 1984 and 1988, Brennan and Subrahmanyam (1996) estimate Kyle's (1985) price-impact parameter, λ, by regressing the trade by trade price change on the signed transaction size. Then they sort NYSE stocks and form portfolios based on λ and examine the relation between λ and stock return during 1984-1991. Their results show that high-λ stocks earn significantly higher returns than low-λ stocks. Considering that the intraday data does not cover a long period of time, Amihud (2002) proposes a new price impact measure (measure of illiquidity) which can

be estimated from daily data. He defines the measure as the daily ratio of absolute stock return to its dollar volume, averaged over some period of time. Examining returns of the NYSE stocks during 1964-1997, he also finds stocks with a higher price impact measure earn higher returns.

Trading volume: When a stock is traded more frequently, it is easier for traders to close their position and thus it is more liquid. According to the liquidity hypothesis, firms with relatively low trading volume should offer a higher expected return. Datar, Naik, and Radcliffe (1998) examine the relation between turnover of NYSE stocks and their returns during 1963-1991. They show that low turnover stocks earn higher returns than high turnover stocks after controlling for size, book-to-market ratio, and beta. When investors reduce their trading frequency, the average holding period of the stocks, which is the reciprocal of the stock turnover, is prolonged. They argue that this result supports Amihud and Mendelson's (1986) prediction that less liquid stocks are allocated to investors with longer holding periods and should earn a higher return. Using a regression model which examines the relation between risk-adjusted returns to common risk factors and several firm specific characteristics, Brennan, Chordia, and Subrahmanyam (1998) also find a negative relation between trading activities and stock returns for both NYSE/AMEX and NASDAQ stocks during 1966-1995.

Trading speed: When the order of a stock can be executed faster, that stock is more liquid. Liu (2006) proposes a new liquidity measure, LM12, to capture trading quantity, trading cost, and trading speed at the same time, with a particular focus on the trading speed. He defines LM12 as the standardized turnover-adjusted number of zero daily trading

volume over the prior 12 months. High-LM12 stocks do not have trades every day and are illiquid. His results show that for NYSE/AMEX stocks, stocks in the highest LM12 decile significantly outperform stocks in the lowest LM12 decile by 0.682% per month over a 12-month holding period. After controlling for size, book-to-market, turnover, and past returns, this liquidity premium is still robust.

2.1.2 Liquidity Risk

In addition to studies which focus on the relation between stock returns and different dimensions of liquidity, many papers investigate whether liquidity is a common risk factor. Pastor and Stambaugh (2003) argue that when the market-wide liquidity is low, investors who face a solvency constraint require higher expected returns for holding illiquid assets. They introduce the aggregate liquidity of the market to the asset pricing model and find stocks with high sensitivities to changes of market liquidity earn higher returns than stocks with low sensitivities by 7.5 percent per year during 1966-1999 after the adjustment for exposures to the market return, size, value, and momentum factors. Their finding shows that market-wide liquidity is an important state variable for asset pricing.

Acharya and Pedersen (2005) propose liquidity-adjusted CAPM which introduces three liquidity betas. The first liquidity beta captures the commonality in liquidity with the market liquidity and is positive for most securities . This indicates that expected return increases with the covariance between the asset's illiquidity and the market illiquidity. The second liquidity beta measures the co-movement of the return of asset i with the market-wide illiquidity. It is usually negative because a rise in market illiquidity reduces asset values. The third liquidity beta shows the liquidity sensitivity to market returns. It is

usually negative for most stocks because investors are willing to accept a lower expected return on a security that is liquid in a down market. Using Amihud's (2002) illiquidity measure to proxy for the illiquidity for NYSE/AMEX stocks during 1963-1999, Acharya and Pedersen (2005) find evidence supports their model.

Unlike prior studies which use liquidity measures as pricing factors, Liu (2006) constructs a liquidity factor from mimicking portfolios of his liquidity measure, LM12. He documents that the mimicking liquidity factor is highly negative correlated with the market and should be a state variable in asset pricing. In his paper, he proposes a two-factor augmented CAPM that includes both market and liquidity factors. Compared with CAPM and Fama and French 3-factor model, his two-factor model is more powerful because it captures the liquidity risk and explains well for various anomalies such as size premium, value premium, effects of earnings-to-price on stock returns, and returns on long-term contrarian strategies. His results suggest that liquidity risk is an important factor in asset pricing.

Although the liquidity risk can explain the liquidity premium found in prior studies, there is another stream of papers studying the possibility that the liquidity is affected by irrational investors. As a result, the low return of liquid stocks can be partially driven by irrational investors' revision of their mispricing. This indicates that the liquidity premium may not solely result from the liquidity risk. In next section, we review the relation between liquidity and irrational investors' behavior proposed by literature.

2.2 Liquidity, Irrational Behavior, and Stock Returns

Under a frictionless world, irrational investors' behavior does not affect asset prices because arbitrageurs trade immediately and then force the stock price to converge to its

fundamental value. However, in the real world, arbitrage is limited. Miller (1977) points out that in the presence of a short-sale constraint, the stock price is overpriced because pessimistic investors cannot sell the stock. Black (1986) argues that informed traders do not take large enough positions to eliminate the mispricing because their information does not guarantee profits. Taking a large position is too risky. Campbell and Kyle (1993) posit that noise traders affect prices because fundamental risk deters smart-money investors from aggressively betting against noise traders. Shleifer and Vishny (1997) suggest that arbitrageurs can only specialize a small group of stocks and they avoid to take extremely volatile arbitrage position because their capital providers use their performance to ascertain their ability to invest profitably. Due to the above limits of arbitrage, stock prices are affected by irrational investors.

In the following subsections, we review how irrational behavior affects liquidity and returns. We first review evidences of investor sentiment and overconfidence from prior studies. Then we review relations among liquidity, sentiment/overconfidence, and stock returns both in time series and in cross section.

2.2.1 Evidence of Sentiment and Overconfidence

In this subsection, we focus on two sources of heterogeneous beliefs between rational and irrational investors: sentiment and overconfidence. Sentiment could lead to the differences in valuation between rational investors and irrational investors. When investor sentiment is high and investor valuations of stocks are dispersed, stock prices could be overvalued if there is a short-sale constraint. Using different measures of sentiment, many studies have found evidences that sentiment affects stock prices:

Closed-end fund discounts, ratio of odd-lot sales to purchases, and net mutual fund redemption: Individual investors are more likely to be affected by sentiment. Because the investors of mutual fund and traders of odd lots are usually individual investors, closed-end fund discounts, ratio of odd-lot sales to purchases, and net mutual fund redemption can be used as measures of general investor sentiment. Neal and Wheatley (1998) examine whether these three measures can predict returns. They find little relation between the odd-lot ratio and stock returns. However, they find closed-end fund discounts and net redemption can predict size premium. Specifically, they find closed-end fund discounts and net fund redemption are both positive related to returns on small firms. On the contrary, on large firms, the relation between closed-end fund discounts and returns is not significant and the relation between net redemption and returns is negative. These results indicate that when closed-end fund discounts and net redemption are higher, size premium is higher, which supports the hypothesis that investor sentiment affects stock returns.

Buy-sell imbalance of retail investors: Because individual investors are subject to investor sentiment, their trading activities reflect their sentiment. Using the transaction data of retail investors at a major U.S. discount brokerage house over the period 1991 to 1996, Kumar and Lee (2006) construct a buy-sell imbalance (BSI) measure for different stock portfolios to proxy changes in retail sentiment. They find BSI can predict stock returns. For small stocks, low-price stocks, firms with low institutional ownership, and value stocks, the retail concentrations and retail trading activities are extraordinarily high. These stocks also have significantly positive factor loadings on BSI. Besides, they also find individual investors tend to buy or sell stocks in concert. When one set of retail investors

buy (sells) stocks, another set of retail investors also tends to buy (sell) stocks. Their evidence shows that retail investors are affected by sentiment and their sentiment affects stock returns.

Bull-bear spread: Using "bull-bear spread" from a direct survey data to measure investor sentiment, Brown and Cliff (2005) investigate the effect of sentiment on stock returns. They find sentiment appears to have little predictive power for subsequent near-term returns. However, sentiment does have effect on long-term stock returns. High levels of sentiment lead to significantly lower returns over the next two or three years. A one standard deviation of bullish shock to sentiment results in a subsequent underperformance of the market by 7% over the next three years. This indicates that asset values are affected by investor sentiment and market prices revert to fundamental values over several years.

Sentiment Index: Baker and Wurgler (2005) propose a sentiment index to measure investor sentiment at the market level. The sentiment index is constructed based on the first principal component of six sentiment proxies: closed-end fund discounts, NYSE share turnover, the number of IPOs, the average first-day returns of IPOs, the share of equity issues in total equity and debt issues, and the dividend premium. They predict that a broad sentiment wave on the market can have different effects on stocks because sentiment-based demand shocks and arbitrage constraints differ across stocks. Stocks that are likely to be most sensitive to speculative demand also tend to be the riskiest and costliest to arbitrage. Therefore, prices of those stocks tend to be overvalued when investor sentiment is high and their subsequent returns would be lower than other stocks. They find small, young, unprofitable, high-volatility, non-dividend-paying, distressed, and growth firms react

disproportionately to the broad wave of investor sentiment. Their results support that investor sentiment affects asset prices in the cross section.

In addition to sentiment, overconfidence also result in disagreements among investors. From psychological literature, there are several manifestations of overconfidence. In most theoretical framework, overconfidence refers to investors' overestimation of the precision of their knowledge (miscalibration). Besides, people also tend to believe they are better than average person (better than average effect). They are usually unrealistically optimistic about future events (unrealistic optimism) , and tend to overestimate the possibility of their success in the future (illusion of control). Odean (1999) argues that traders in financial markets are more overconfident than the general population because people who are more overconfident in their investment abilities are more likely to become traders or to trade on their account frequently. Furthermore, traders who perform well in the past may attribute their success to their ability and grow overconfidence.

Because overconfident investors have unrealistic beliefs about their expected trading profits, many theoretical and empirical studies show that overconfident investors tend to trade too often. Odean (1998) assumes investors believe their information is more precise than it actually is and develops a model to show that when investors are overconfident, trading volume and return volatility increase. Investigating ten thousand customer accounts provided by a nationwide discount brokerage house, Odean (1999) finds investors with discount brokerage accounts, who are more likely to be overconfident, trade frequently. He documents that not only these investors do not earn enough returns from their frequent trades to cover trading costs, but also, on average, the securities they buy underperform

those they sell. He concludes that these investors not only are overconfident, but must be systematically misinterpreting information available to them. Statman, Thorley, and Vorkink (2003) test the relation between overconfidence and trading volume. They argue that after a period of high returns, the degree of investors' overconfidence increases due to their investment success. Their results show that after bull markets, trading activities increase, which supports the Odean (1998). Using trading data of 215 individual investors who answer a questionnaire which is designed to measure overconfidence, Glaser and Weber (2003) also find investors who believe they are better than the average person in terms of investment skills or past performance trade more. However, they do not find measures of investors' overestimation of the precision of their knowledge are related to trading volume.

2.2.2 Liquidity, Sentiment/Overconfidence, and Stock Returns

The empirical evidence from studies reviewed in the previous subsection suggests that some investors may not be rational. They may be affected by sentiment or have certain degree of overconfidence. Because investor sentiment and overconfidence increase differences in beliefs among investors, when short-sale constraints exist, volume can convey information about investors' mispricing of stocks and thus predict future returns both in time series and in cross section.

Baker and Stein (2004) develop a model which shows a relation between time-series changes in volume and stock returns. In their model, there are two types of outside investors: smart investors who have rational expectations and dumb investors who underreact to order flows. Dumb investors have positive (negative) sentiment when their own valuation of stocks is higher (lower) than smart investors' valuation. When there are short-sale

constraints, dumb investors trade only when their sentiment is positive and keep silent when their sentiment is negative. Therefore, their participation in the market is associated with both increases in stock prices and decreases in price impacts. When price impacts decrease, dumb investors trade more frequently and the market is more liquid. As a result, an increase in liquidity indicates that the market is dominated by optimistic dumb investors. Stocks are overvalued at this time and their subsequent returns will be lower.

Baker and Stein's (2004) model is supported by Johnson, Lei, Lin, and Sanger (2006). Johnson, Lei, Lin, and Sanger (2006) develop a simple volume-based measure of investor sentiment, the trading volume trend per unit of time, for individual stocks and investigate the relation between the sentiment measure and stock returns. They find that trading volume trend over three year is significantly negative related with expected stock returns. The negative relation is robust after controlling for liquidity measures, turnover volatility, and other possible determinants of returns. Their results suggest that investor sentiment has a long-term effect on stock returns.

Scheinkman and Xiong (2003) model a cross-sectional relation between trading volume and stock returns. In their model, overconfidence is the source of differences in opinions. When short-sale constraints exist, the ownership of a stock gives investors a chance to sell the stock in the future to other optimistic investors who are willing to pay more. Therefore, when investors buy stocks, they also acquire a re-sale option. Due to the re-sale option, asset prices incorporate a speculative component. A higher level of investors' overconfidence leads to a larger difference in opinions, which increases the trading frequencies and then boosts the value of the re-sale option at the same time. As a result, when the trading

frequency for a stock is high, the stock tend to have a high level of price and a low expected future return.

Both Piqueira (2006) and Mei, Scheinkman, and Xiong (2004) test Scheinkman and Xiong (2003) empirically. Piqueira (2006) investigates the effects of turnover on returns for NYSE and NASDAQ stocks from 1993 to 2002. In order to rule out the possibility that turnover measures liquidity rather than speculative trading from overconfident investors, she runs a regression and controls for the illiquidity measures such as bid-ask spread and price impact in her model. Her results show that turnover has a significant negative effect on future returns. Among NASDAQ (NYSE) stocks, when the monthly turnover increases by one standard deviation, the subsequent monthly return decreases by 0.75% (0.35%). Mei, Scheinkman, and Xiong (2004) investigate whether speculative trading contributes to the Chinese A-B share premia. In their sample period, class A shares can only be bought by domestic investors; while class B shares are restricted to only foreign investors. Although the fundamental value for class A and B shares is the same, the price of class A shares are on average 420% higher than that of class B shares. In addition, the turnover of A shares per year is 500%; while the turnover of B shares per year is 100%. Mei, Scheinkman, and Xiong (2004) examine the cross-sectional correlation between share turnovers and A-B share premia. They find that A-share turnover can explain 20% of the cross-sectional variation of the A-B share premia. On the contrary, B-share turnover does not have significant effect on the A-B share premia. Their results suggest that speculative trading affects non-fundamental component of stock prices.

2.3 Liquidity and Quarterly Earnings Announcement

In this study, we link the liquidity with the announcement effects during quarterly earnings announcement periods. Quarterly earnings announcements are scheduled announcements. Investors expect an upcoming announcement every quarter. When the timing of a news announcement can be anticipated in advance, information asymmetry increases before the announcement. Kim and Verrecchia (1991) present a model in which investors actively gather private information before a news release. As a result, some investors or corporate insiders can have superior information about the fundamental value of a security before the announcement. During this period, the adverse selection problem is severe. Informed traders with bad news have an incentive to sell stocks, and those with good news have an incentive to buy. Lee, Mucklow, and Ready (1993) examine market makers' reaction prior to earnings announcements. They find that market makers widen spreads and reduce depth when they anticipate an upcoming earnings announcement. They interpret the results as market makers reduce liquidity to offset adverse selection costs associated with trading with informed investors. Krinsky and Lee (1996) examine changes in liquidity around earnings announcements by decomposing the bid-ask spread. They also find that the adverse selection component of bid-ask spreads increases in anticipation of upcoming earnings announcement.

When the market anticipates a news release, theories in market microstructure suggest that liquidity will deteriorate before the announcement. Admati and Pfleiderer (1988) and Easley and O'Hara (1992) both develop models to show that volume might decrease prior to scheduled news releases because discretionary liquidity traders fear being exploited by

informed traders and are unwilling to trade. On the contrary, the informed investors will trade actively to take advantage of their private information because after the announcements, their private information could be worthless. Therefore, the decrease of trades from prudent liquidity traders can be partially offset by the trades from aggressive informed investors. Chae (2005) investigates trading volume before scheduled (earnings announcements) and unscheduled corporate announcements (acquisition, target, and Moody's bond rating change announcement) to explore how traders respond to private information. He finds that the cumulative abnormal trading volume decreases prior to scheduled announcements and the amount of decrease is positively related to the degree of information asymmetry. On the contrary, after the announcement, volume increases with the information asymmetry. For the unscheduled announcements, volume increases dramatically before the announcements and there is little relation between changes of volume and proxies for information asymmetry. His results support that liquidity traders delay their trades until the information asymmetry is resolved when they expect an announcement will be made soon.

Lee (1992) also examines the volume reaction for small and large trades to earnings news of 230 NYSE firms during 1988. He finds mean abnormal volume increases in both large and small trades at the announcement day and the day after the announcement, especially for large trades. However, he also observes unusual small trades for buying activities from the day before the announcement, irrespective of the direction of the upcoming news. The anomalous buying activities of small traders is robust across firm size, trading volume, and different earnings expectation models. Chae (2005) and Lee (1992) suggest that before

earnings announcements, some discreet liquidity traders withdraw their trades; while other small noisy traders trade aggressively.

Unlike Lee (1992) and Chae (2005) who examine the changes of volume during earnings announcement periods, Lee and Swaminathan (2000) and Frazzini and Lamont (2006) link the past trading volume with the returns around earnings announcements. Lee and Swaminathan (2000) argue that trading volume provides information about investors' misperceptions of future earnings. They find that analysts are more optimistic about the earnings growth for high-volume stocks, but their future operating performance (measured by return on equity) tends to be lower. They show that during a four-day event window of earnings announcements from day -2 to day 1, returns are significantly more positive for low-volume firms than for high-volume firms over each of the subsequent eight quarters after the volume portfolios are formed. Lee and Swaminathan (2000) argue that the lower return of high-volume stocks during earnings announcement periods results from investors' correction of the misperceptions about future earnings. Frazzini and Lamont (2006) find the effect of earnings announcements on stock returns, announcement premium, is on average positive. Stocks with higher volume concentration around past earnings announcements period earn higher announcement premium[2]. They also show that stocks which have high announcement premium usually have high small investor buying. These results indicate that for some stocks, the buying pressure from individual investors drive prices up around earnings announcements. Although in this study we also examine the relation between

[2]Volume concentration focuses on whether trading activity tends to be concentrated in the four-month announcement period out of the year, rather than on whether the absolute turnover or trading volume occur during the announcement period. Therefore, our results do not contradict Frazzini and Lamont's (2006) results because the trading activities of illiquid stocks tend to be more concentrated during the month of earnings announcements than those of liquid stocks.

trading volume and announcement returns, we focus on the effect of speculative trading on the announcement returns after controlling other possible determinants. In the next chapter, we describe the empirical predictions.

Chapter 3 Empirical Prediction

Prior studies have documented significant liquidity premiums. Using bid-ask spreads as a measure of liquidity, Amihud and Mendelson (1986) find a significant liquidity premium of 0.675 percent per month between high-spread firms and low-spread firms for NYSE stocks from 1961 to 1980. Similarly, Brennan and Subrahmanyam (1996) measure liquidity based on Kyle's (1985) measure of market depth, λ, and report 0.57 to 1.44 percent premium (for different size groups) per month between high-λ firms and low-λ firms for NYSE stocks during the period 1984-1991. In a more recent study, Liu (2006) proposes a new liquidity measure, standardized turnover-adjusted number of zero daily trading volumes over the prior 12 months, and shows that stocks in the least liquid decile outperform stocks in the most liquid decile by 0.682 percent per month for NYSE/AMEX stocks during 1963-2003. In these studies, the annualized liquidity premiums vary from 6.84 percent to 17.28 percent. The magnitude of the annualized liquidity premium is sizable and prior studies attribute liquidity premium to different transaction costs and liquidity risks between liquid and illiquid stocks.

In this study, we investigate whether investors' speculative trading also contribute to liquidity premium. Our hypotheses are developed based on Baker and Wurgler (2006), Baker and Stein (2004), and Scheinkman and Xiong (2003). Baker and Wurgler (2006) argue that investor sentiment can drive up the demand for speculative investments and causes cross-sectional effects on stock returns. When the investor sentiment is higher (lower), investors desire stocks which have a more (less) subjective valuation. Therefore,

stocks with more subjective valuations tend to have more speculative trading. When short-sale constraints exist, these stocks are overvalued and their subsequent returns are low. Because speculative investments boost the trading activities of a stock, we argue that high liquidity can be linked with intensive speculative trading and relatively high level of overpricing. Baker and Stein (2004) develop a model which links liquidity to subsequent stock returns. They show that with short-sale constraints, a high level of liquidity indicates that the market is dominated by irrational investors whose valuation of stocks is higher than rational investors. Therefore, from Baker and Stein (2004) we can infer a negative relation between cross-sectional variation in liquidity and subsequent stocks returns.

Scheinkman and Xiong (2003) provide a model which directly shows a positive relation between cross-sectional trading activities and a speculative component of stock prices. Their model is consistent with the greater fool theory which states that overconfident investors think that they can make money by buying securities, whether overvalued or not, and later selling them at a higher price because they figure that there would always be someone (a greater fool) who is willing to pay more. In their model, there are two groups of overconfident investors. Both of them observe their own signal as well as the signal of the other group. The over-confidence makes them believe that the informativeness of their own signal is larger than its true informativeness. Consequently, when forming their beliefs, they put more weight on the surprises of their own signal, which leads to differences in beliefs between investors in different groups. Due to differences in beliefs and short-sale constraints, the ownership of a stock gives the investor an American-type re-sale option. Someday in the future, the current owner think they can make profits from selling his

share to other investors who have more optimistic beliefs. Because of the re-sale option, overconfident investors pay prices that are higher than their subjective valuation of the asset's fundamental value. Although the prices they pay are too high, they believe in the future they can find another overconfident investors who are willing to pay even more. As a result, a speculative component, the difference between the transaction price and the asset's fundamental value, is embedded in the stock price. Scheinkman and Xiong (2003) show that in the cross section, when the degree of overconfidence is higher, investors trade more frequently and the speculative component is larger. This indicates that liquidity of a stock may be magnified by speculative trading of overconfident investors and thus liquid stocks tend to have larger speculative components (more overpricing) than illiquid stocks.

Based on Baker and Wurgler (2006), Baker and Stein (2004), and Scheinkman and Xiong (2003), this study examines whether overconfident investors of liquid stocks revise their overpricing after quarterly earnings announcements. We introduce quarterly earnings announcements because the announcements make it possible for investors to correct the mispricing of an overvalued stock at the same time. Abreu and Brunnermeier (2003) argue that when bubbles exist, rational arbitrageurs know the market will eventually collapse. However, if the bubble will not burst soon, they would like to ride the bubble and then sell the bubble asset right before the bubble crashes. To burst a bubble, there must be a sufficient mass of arbitrageurs selling the bubble asset at the same time. Because arbitrageurs may have different opinions about the timing of the bubble, it is difficult for them to synchronize their sales. As a result, the bubble persists until a synchronizing event which induces a sufficient number of arbitrageurs to sell their assets.

In this study, we posit that a quarterly earnings announcement can be the synchronizing event. Although our analysis focus on the revision of overpriced liquid stocks rather than the crash of a bubble, the revision of mispricing still requires a sufficient number of investors to adjust their mispricing at the same time. Quarterly earnings announcements provide information about a firm's fundamental value and give investors a chance to correct their mispricing. When overconfident investors find the signal their get before the announcement is far from the value revealed in the financial report, they learn that their own information is not as informative as they thought it should be. As a result, they revise their overconfidence, which causes the mispricing to diminish. This suggests that around the quarterly earnings announcements, liquid stocks which have more speculative trading and a larger speculative component in their prices before the announcements should show a lower abnormal return than illiquid stocks because the price adjustment of liquid stocks around this period also reflects the revision of investors' overpricing[3]. As Lee and Swaminathan (2000) argue, during a very short event window, the risk differences have little effect on returns. Therefore, in the paper, we focus on the 3-day event window from day 0 to day 2. This short event window enables us to hold constant the effect of risks on the announcement returns. Thus, the announcement effect reflects the information innovation of the news and the revision of the mispricing. After controlling for the information

[3]We do not argue that the return of a liquid stock shows a cyclic pattern in which the stock return increases during the non-event period and decreases right after the quarterly announcement. On average, liquid stocks tend to be overvalued and have lower announcement returns. However, not all liquid stocks are overvalued. Because investor sentiment and stock liquidity change over time, a liquid stock which is overvalued in one quarterly is not necessarily overvalued in another quarter. Before the announcement, investors do not know which liquid stock is overvalued. After the announcement, a group of investors learn their mispricing for some liquid stock and possibly another group of investors start to become overconfident and speculate in another stock. Therefore, the on-average low announcement returns of liquid stocks result from different stocks and behavior of different investors.

innovation, the differences of abnormal returns between liquid and illiquid stocks around the short period of quarterly earnings announcements can be viewed as an evidence that speculative trading affects liquidity premium.

Hypothesis 1: Around earnings announcements, liquid stocks which are over-priced due to intensive speculative trading have lower abnormal returns than illiquid stocks after controlling for the informativeness of the announcements.

The second hypothesis in this study links cross-sectional trading activities with the time-series changes of volume around quarterly earnings announcements. Because quarterly earnings announcements are scheduled events, before the announcements, all investors expect the news release in the near future. During this period, the information asymmetry increases due to information leakage and investors' aggressive excavation for private information. Therefore, the number of informed investors before announcements increases. They usually bid aggressively prior to the announcements because after the announcements, their information could be worthless. Facing the increasing number of informed trading, uninformed traders become reluctant to trade and will postpone their trades until news release if they have timing discretion. Therefore, before quarterly earnings announcement, the trading volume should decrease with the information asymmetry.

The negative relation between information asymmetry and trading volume before quarterly earnings announcements is documented by Chae (2005). He finds prior to the quarterly announcements, the trading volume of NYSE/AMEX stocks decreases by 9% from day -10 to day -3. However, investigating small trades around quarterly earnings announcements, Lee (1992) documents unusually high buying activities in the small trades

of 230 NYSE firms, irrespective of the direction of news. Together, Chae (2005) and Lee (1992) indicate that, before quarterly earnings announcements, some prudent liquidity traders do withdraw their trades to avoid trading with informed traders; while some small investors also bid more aggressively than usual to speculate in the upcoming news release.

Although on average, the trading volume decreases before quarterly earnings announcement, investors' speculative trading can lead to cross-sectional variation. During this period when discretionary liquidity traders postpone their trades, the market is dominated by informed traders and speculative investors. In Baker and Stein (2004) and Baker and Wurgler (2006), if stocks are liquid because of investor sentiment or speculative trading, liquid stocks may have the bundle of salient characteristics that attract speculative investors. As a result, before quarterly announcements, liquid stocks which are preferred by speculative traders should experience less decrease in volume than illiquid stocks. In Scheinkman and Xiong's (2003) framework, increase in information asymmetry may enlarge the differences of beliefs among investors, which then increases the trading frequency and the speculative component of stock prices. If investors of liquid stocks tend to be more overconfident than investors of illiquid stocks, there will be more speculative trading for liquid stocks before quarterly earnings announcements. Therefore, for liquid stocks, the volume decrease caused by discreet liquidity traders can be partially or fully offset by overconfident speculators.

Hypothesis 2: Before quarterly earnings announcements, the volume decrease, if any, of liquid stocks should be lower than that of illiquid stocks because there are more speculative trading for liquid stocks during this period.

The third hypothesis of this study investigates whether there is a significant proportion of the perceived liquidity premium realized during quarterly earnings announcement periods. Quarterly earnings announcements convey information about firms' fundamental values. If liquid stocks are mispriced by overconfident investors, after the quarterly earnings announcements when firms' fundamental values are more transparent, overconfident investors may correct their overconfidence and mispricing to some degree and then move stock prices toward their fundamental values. Therefore, the difference of the announcement returns between liquid stocks and illiquid stocks in part captures the effect of investors' irrational behavior on stock returns. If the perceived liquidity premium is partially affected by speculative trading of overconfident investors and the quarterly earnings announcement is one of the synchronizing events which enables investors to correct mispricing, we should observe a non-trivial proportion of the perceived liquidity premium realized around quarterly earnings announcements.

Hypothesis 3: If speculative trading contributes to the perceived liquidity premium, there should be a significant proportion of the perceived liquidity premium realized during quarterly earnings announcement periods.

Chapter 4 Data and Research Design

In this chapter, we describe the source of data, research design, and summary statistics of our sample.

4.1 Data

Prior studies have proposed many different liquidity measures to capture different dimensions of liquidity. In this study, we use Liu's (2006) LM12, the standardized turnover-adjusted number of zero daily trading volumes over the prior 12 months, to measure liquidity. That is,

$$LM12 = \left(ZeroVol + \frac{1/TO}{Deflator} \right) \times \frac{21 \times 12}{NoTD}, \tag{1}$$

where $ZeroVol$ is number of days with zero volume in prior 12 months, TO is 12-month turnover, which is the sum of daily turnover (trading volume over number of shares outstanding) over the prior 12 months, $NoTD$ is the total number of trading days in the market over the prior 12 months, and $Deflator$ is chosen such that $0 < \frac{1/TO}{Deflator} < 1$. Following Liu (2006), we let $Deflator$ equal to 11,000. The first term captures the continuity of trading and the difficulty in executing an order. The second term measures the trading quantity and is used to distinguish two stocks with the same number of non-trading days from each other. This liquidity measure particularly focuses on the trading speed of a stock. If LM12 of a stock is larger, trading may be delayed because it is more difficult for investors or market makers to find a trading counterpart. Therefore, stocks with higher LM12 is more illiquid.

We choose LM12 as the liquidity measure for three reasons. First, LM12 is consistent with the concept of the trading volume in Scheinkman and Xiong's (2003) model. In their model, the trading frequency is measured by "duration between trades." For stocks which do not have trades for many days, LM12 can reflect the duration between trades more directly than volume and turnover. Second, if we consider transaction prices as information, LM12 also reveals the amount of information available to investors. More information may fuel speculative trading. Scheinkman and Xiong's (2003) argue that increase in information of a stock enlarges differences of opinions, which may induce frequent speculative trading and boost the speculative component of stock prices. Prices of high-LM12 stock are usually stale and are less likely to induce speculative trading. Third, LM12 captures the continuity of trading and can better measure the cumulative effect of speculative trading from overconfident investors. Black (1986) argues that noise traders must trade to have their influence and the noise they put into stock prices is cumulative. Although volume and turnover also provides information of trading activities, it does not indicate when trades occur. Trades may cluster during a period of time and then disappear during another period of time. For these stocks, the speculative component cannot be boosted continuously and may drop during the period without any volume.

Liu's LM12 is very similar to the measure of transaction costs proposed by Lesmond, Ogden, and Trzcinka (1999). Lesmond, Ogden, and Trzcinka (1999) argue that if the value of the information is insufficient to exceed the costs of trading, investors will not trade, which causes a zero return. Therefore, the incidence of zero returns can be used to estimate the transaction costs which is one dimension of liquidity. By definition, the dominant factor

of LM12 is the number of zero-volume days over prior 12 months. Because zero volume is usually associated with zero returns, the LM12 is highly correlated with the number of zero daily returns. Although these two liquidity measures are quite similar, the concepts they convey are different. The LM12 captures the trading activities; while the number of zero daily returns proposed by Lesmond, Ogden, and Trzcinka (1999) measures transaction costs. Since in this study, we focus on speculative trading which affects liquidity, the LM12 is a more straightforward measure than the number of zero daily returns.

The sample of our study comprises quarterly earnings announcements of all ordinary common shares from NYSE, AMEX, and NASDAQ during the period from 1982 to 2004. Earnings announcement dates come from I/B/E/S actuals database. Stock prices, returns, shares outstanding, and trading volume are extracted from CRSP. Book values of firms is obtained from Compustat. We also obtain the number of analysts following, long-term growth forecasts, and mean analysts' forecasts of earnings per share from I/B/E/S Summary files.

Data from I/B/E/S, CRSP, and Compustat are merged by cusip numbers. To be included in our sample, firms must exist in both I/B/E/S and CRSP. We also require non-missing value for LM12 at the end of June each year. Following Liu (2006), if shares outstanding and trading volume of a firm is missing on any day during the previous 12 months, we exclude that firm from our sample[4]. Furthermore, in order to estimate the abnormal return and abnormal volume during the announcement period, we require at least

[4]This criterion might be strict. However, because the number of zero daily volume is the dominant factor of the LM12 and we cannot know whether the missing value of trading volume is zero or not, the LM12 of firms with missing daily volume may not be comparable with the LM12 of firms without any missing daily volume. In CRSP, from 1982 to 2004, about 9% firms are IPO firms which are introduced to the public less than one year and 7% firms have missing daily volume.

24 non-missing daily data during the estimation period from day -40 (40 days before the announcement) to day -11 (11 days before the announcement). Based on the above criteria, our final sample contains 11,330 firms and 260,109 quarterly earnings announcements.

4.2 Research Design

In this study, we use traditional event studies to test our hypotheses. At the end of June in year t, we sort all stocks listed on NYSE, AMEX, and NASDAQ in CRSP by LM12. Based on the sort, we classify each firm into one of the ten LM12 groups. The breakpoints are determined based on all NYSE/AMEX/NASDAQ stocks. Then we compute the abnormal return of announcements around the announcement period from Fama and French (1993) 3-factor model. Specifically, for each announcement, we use the data from during the estimation period (from day -40 to day -11) to estimate the factor loadings, β_{MKTRF}, β_{SMB}, and β_{HML} from the following equation:

$$R_{it} - R_{ft} = \alpha_i + \beta_{i,MKTRF} MKTRF_t + \beta_{i,SMB} SMB_t + \beta_{i,HML} HML_t + e_{it}, \tag{2}$$

where R_i is the return of stock i, R_f is risk-free rate, $MKTRF$ is market risk premium, SMB is size premium, and HML is value premium. The abnormal return, AR_i, and cumulative abnormal return, CAR_i, for firm i around the announcement are then defined as:

$$AR_{it} = R_{it} - R_{ft} - \beta_{i,MKTRF} MKTRF - \beta_{i,SMB} SMB - \beta_{i,HML} HML \tag{3}$$

$$CAR_i = \sum_{t=1}^{t=T} AR_{it} \tag{4}$$

To rule out the possibility that our results are driven by a specific asset pricing model, following Lee and Swaminathan (2000), we also define the abnormal return as the

market-adjusted return in the robustness test. The market-adjusted return is calculated as: $R_{it} - R_{mt}$, where R_{mt} is the NYSE/AMEX/NASDAQ value-weighted index.

To test abnormal volume around earnings announcements, we follow the method proposed by Chae (2005). Chae (2005) argues that turnover can measure trading volume better than absolute volume because it corrects for the number of shares outstanding and thus provides a cleaner interpretation of the results. He further shows that turnover is non-normal and then applies the log function to correct for the extreme skewness and kurtosis of turnover. He defines the abnormal trading volume as the log turnover during the test period minus the average log turnover during the 30-day estimation period from day -11 to day -40. In our study, however, stocks with high LM12 have many missing log turnover because zero daily volume occurs frequently. If we delete missing log turnover, our result for high-LM12 stocks may be biased. To overcome this problem, we add one share to daily volume when we calculate log turnover. The log turnover and abnormal turnover are defined as follows:

$$Log\ Turnover_{i,t} = Log\left(\frac{1 + Trading\ Volume_{i,t}}{Shares\ Outstanding_{i,t}}\right) \quad (5)$$

$$Abnormal\ Turnover_{i,t} = Log\ Turnover_{i,t} - Average\ Log\ Turnover_{i}, \quad (6)$$

where $Average\ Log\ Turnover_i$ is the average of log turnover over the estimation period from day -11 to day -40 for firm i.

In the first and second hypotheses, we compare the abnormal return and abnormal volume between low-LM12 stocks and high-LM12 stocks. If investors of low-LM12 stocks show higher degree of overconfidence, engage in speculative trading before quarterly announcements, and revise their overpricing after the announcements, we should observe

that low-LM12 stocks demonstrate lower abnormal returns after announcements and higher trading volume before announcements than high-LM12 stocks.

In the third hypothesis, we calculate how much annual liquidity premium, return of high-LM12 stocks minus return of low-LM12 stocks, is realized during the 3-day event window from day 0 to day 2. In each year from July year t to June year $t+1$, the annual raw return of firm i is calculated as $\Pi_{mon=Jul,t}^{Jun,t+1}(1+R_{i,mon})-1$. The annual liquidity premium is the difference between the average raw return of high-LM12 stocks and that of low-LM12 stocks. For each announcement of firm i, we define the event-day return as $\Pi_{d=0}^{2}(1+R_{i,d})-1$. Each year for each firm i, we take the sum of the event-day returns during all of the four quarterly earnings announcement periods. If a stock has missing quarterly announcements, the return of the missing announcement is replaced with the average return of all other quarterly announcements during the same year. We calculate the cross-sectional mean for each LM12 group each year. The liquidity premium realized during earnings announcements is the time-series average of the differences between the return of high-LM12 stocks and that of low-LM12 stocks around quarterly earnings announcements. T-statistics are used to test whether the annual differences over the sample period is significant different from zero.

Considering that the liquidity premium realized during quarterly earnings announcements may also reflect the information shock of the earnings and some firm characteristics, we run regressions of the cumulative abnormal returns around event periods on LM12, as well as proxies of information shock and firm characteristics. If the difference of abnormal returns between high-M12 stocks and low-LM12 stocks are partially driven by speculative

trading, after controlling for other factors, the coefficient of LM12 should be significant positive. The details of the regression model are described in section 5.6.

4.3 Descriptive Statistics

The descriptive statistics of our sample are presented in Table 1. Panel A shows the distribution of quarterly earnings announcements each year. Year t refers to the period from July, year t to June, year $t+1$. Because our sample period ends in Dec. 2004, only two quarters are included in year 2004. From the original I/B/E/S Actual Database, there are about 23,000 firms and 467,000 quarterly earnings announcements. On average, about one-third of firms and announcements in I/B/E/S do not have matches in CRSP per year[5]. Firms which are excluded due to missing LM12 and missing daily data during the estimation period are less than 10 percent of the original I/B/E/S sample. More than half of these firms are IPO firms which do not have trading data for one whole year. The number of stocks averages 3,209 per year, ranging from a low of 488 in 1982 to a high of 4972 in 1999. On average, there are about 11,309 quarterly earnings announcements per year. The lowest number of announcements is 536 in 1982. The highest number of announcement 18,072 in 1999.

Panel B of Table 1 provides the characteristics of announcements for ten LM12 groups[6]. Because the breakpoints of the ten groups are determined by all CRSP firms, instead of the merged sample of I/B/E/S and CRSP, the numbers of announcements for

[5]We merge I/B/E/S and CRSP by cusip. When the cusip of a stock change during the sample period, we use the latest cusip. 42% of the unmatched firms (about 66,000 announcements) are firms which change cusip during the sample period. The other 58% unmatched firms are those listed on OTC Bulletin Board, Pink Sheets, or other places.

[6]Following Hong, Lim, and Stein (2000), if the number of analyst following in I/B/E/S is missing, we assume it is zero.

Table 1: Summary Statistics

This table provides summary statistics of the sample. Panel A shows the number of observations in each year after filters are applied. Sample contains 260,109 quarterly announcements from 1982 to 2004. Year t refers to the period from July year t to June year $t+1$. To be included in the sample, firms must exist in CRSP. For each firm to be included in the sample of year t, LM12 must be available. That is, firms must have non-missing trading data during previous 12 months from Jul. year $t-1$ to Jun. year t. For each announcement, we require at least 24 non-missing daily data during the estimation period from day -40 to day -11. Panel B provides the sample characteristics for ten LM12 groups. At the end of June in each year, all firms are sorted based on LM12 and are divided into 10 groups. The breakpoints are determined based on all stocks listed on NYSE, AMEX, and NASDAQ. Size (in million) and price (in dollar) are values at the end of June. B/M is the ratio of book value from the annual report in year $t-1$ over market value at the end of Dec year $t-1$. Daily return (in percentage), daily turnover, and daily volume (in thousands) are the average of daily return, turnover, and daily trading volume over previous 12 months Return volatility and turnover volatility are the standard deviations of daily return and daily turnover, respectively. # Analyst is the number of analyst following right before the quarterly earnings announcement. If number of analyst following is missing, we assume it is zero. Dividend yield is the ratio of the amount of dividend paid during previous 12 months to stock price in June.

Panel A: Number of observations in each year during sample period

Year	Number of Firms				Number of Announcements			
	I/B/E/S actual database	No match with CRSP	No LM12 & no 24 daily data	Final sample	I/B/E/S actual database	No match with CRSP	No LM12 & no 24 daily data	Final sample
1982	1075	368	219	488	1177	403	238	536
1983	1434	508	383	543	4967	1740	1148	2079
1984	1821	624	175	1022	6173	2039	554	3580
1985	2073	678	147	1248	7170	2291	461	4418
1986	2523	823	262	1438	8837	2822	767	5248
1987	3010	969	284	1757	10658	3314	951	6393
1988	3985	1349	241	2395	12773	4130	755	7888
1989	4549	1635	264	2650	16678	5882	1058	9738
1990	4946	1872	294	2780	18409	6925	1089	10395
1991	5151	1896	373	2882	19548	7179	1327	11042
1992	5641	2067	587	2987	21549	8124	2227	11198
1993	6122	2170	667	3285	22270	7609	2170	12491
1994	6680	2307	781	3592	24289	8078	2801	13410
1995	7431	2610	736	4085	25836	8510	2340	14986
1996	8149	2795	1059	4295	29100	9587	3597	15916
1997	8623	2874	954	4795	30126	9524	3272	17330
1998	8361	2639	785	4937	30201	9220	3041	17940
1999	8297	2593	732	4972	28894	8477	2345	18072
2000	7565	2121	714	4730	26552	7220	2468	16864
2001	7217	2022	405	4790	25718	7006	2058	16654
2002	8144	2972	324	4848	31609	11542	2902	17165
2003	8845	3658	409	4778	33463	13620	1870	17973
2004	7932	2819	590	4523	15207	5221	1193	8793

Table 1 continued

Panel B: Sample characteristics for ten LM12 groups

LM12 Group	1 Low LM12 (Liquid)	2	3	4	5	6	7	8	9	10 High LM12 (Illiquid)	10−1
# Announcement	31663	32028	32126	31909	29938	26748	24133	21423	18325	11816	
LM12	0.0000	0.0001	0.0001	0.1483	1.0937	3.9628	9.9144	23.77	51.15	112.83	112.83***
Size (in millions)	1317.37	1942.07	2839.13	2865.33	3365.21	2086.99	711.95	167.12	63.06	51	-1266***
Size adjusted for inflation	829.04	1253.94	1851.95	1808.49	2009.87	1224.56	403.78	98.67	39.58	31.45	-798***
B/M	0.5065	0.656	0.6864	0.716	0.745	0.7955	0.9066	1.0902	1.2002	1.3918	0.8853***
Stock Price	23.1	23.01	26.34	27.9	23.98	52.3	60.91	24.18	12.04	12.07	-11.03***
Daily return (%)	0.1181	0.0798	0.0693	0.0638	0.069	0.0801	0.1016	0.1252	0.1453	0.1325	0.0144***
Return volatility	0.0441	0.0358	0.0298	0.0272	0.028	0.0321	0.0375	0.0412	0.0434	0.0408	-0.0034***
Daily turnover	0.0156	0.0067	0.0042	0.0031	0.0027	0.0026	0.0025	0.0021	0.0016	0.001	-0.0147***
Daily share volume (in thousands)	776.9	452.17	331.23	249.33	207.4	104.71	40.45	14.25	7.38	2.91	-773.99***
# Analyst	6.6158	5.6837	5.8214	4.8686	3.6863	2.1826	1.2477	0.7452	0.4285	0.1644	-6.4514***
Dividend yield	0.0097	0.0136	0.0204	0.0232	0.0213	0.0192	0.0138	0.0144	0.0169	0.0159	0.0062***
Turnover volatility	0.0183	0.0077	0.0046	0.0035	0.0034	0.0041	0.0046	0.0044	0.0039	0.0032	-0.0151***

the ten LM12 groups vary dramatically. We find I/B/E/S coverage is biased toward low-LM12 stocks[7]. The number of announcements from high-LM12 stocks is only about one-third of the number of announcements from low-LM12 stocks. On average, firms in the lowest four LM12 decile have trades every day. Firms in the largest LM12 decile do not have trade for about 113 days per year.

From Panel B of Table 1, we find book-to-market ratio increases with LM12; while daily turnover, daily share volume, number of analyst following, and turnover volatility decrease with the increase of LM12. Size[8], Price, daily return, and return volatility do not change monotonically with LM12. On average, median-LM12 stocks have larger sizes, higher prices, lower daily returns, and smaller return volatilities than both low-LM12 and high-LM12 stocks.

To sum up, low-LM12 stocks are liquid stocks which capture much attention from analysts. On average, each firm is followed by 6.6 analysts. They tend to be small growth stocks with average price $23 per share. They also have high turnover, high daily return, volatile turnover, low dividend yield, and high return volatility. For high-LM12 stocks, we find more than 83 percent of high-LM12 stocks are not followed by any analyst. On average, high-LM12 stocks are small value stocks with low average price ($12 per share), high return and return volatility, low turnover, and low turnover volatility.

[7]La Porta (1996) documents that I/B/E/S coverage is heavily biased toward big stocks. His sample consists of NYSE and AMEX stocks. He finds 74 percent of the stocks in I/B/E/S are above the median size in CRSP. I/B/E/S only covers 2 percent of the stocks in the smallest size decile in CRSP.

[8]In Table 1, we also report firm size after the adjustment to inflation. We obtain the consumer price index (CPI) of all urban consumers from U.S. Department of Labor and calculate the inflation-adjusted size as size/CPI×100. The average CPI from 1982-1984 is 100.

Chapter 5 Empirical Results

In this chapter, we show the empirical results of our hypotheses and provide various robustness checks for our tests.

5.1 Abnormal Return around Earnings Announcement

In this study, we argue that liquidity can be an indicator of speculative trading by overconfident investors. Because low-LM12 stocks are more liquid than high-LM12 stocks, they are more likely to have frequent speculative trading and to be overvalued than high-LM12 stocks. Quarterly earnings announcements contain information about firm's fundamental values and give overconfident investors a chance to correct their mispricing. If the mispricing is corrected right after earnings announcements, low-LM12 stocks, on average, should earn lower abnormal returns during the announcement period than high-LM12 stocks.

The results of abnormal returns around quarterly earnings announcement are presented in Table 2. We find that abnormal returns right after the announcements increase with LM12. For the lowest LM12 decile, the 3-day cumulative abnormal return from day 0 to day 2 is -0.49%. For the highest LM12 decile, the 3-day cumulative abnormal return is 1.42%. The difference of cumulative abnormal returns between low-LM12 stocks and high-LM12 stocks is 1.91% and is significant at 1% level. This initial result is consistent with our first hypothesis.

Investigating the path of cumulative abnormal returns from day -10 to day 10, as shown in Figure 1, we find the cumulative abnormal returns of the lowest three LM12 decile increase significantly before the announcements but after the announcements they

Table 2: Quarterly Earnings Announcement Effect on Stock Return

This table shows the abnormal returns during quarterly earnings announcement periods. Sample includes quarterly announcements of firms listed on NYSE/AMEX/NASDAQ from 1982 to 2004. The abnormal return is calculated based on Fama and French 3-factor model. At the end of June in each year, all firms are sorted based on Lius liquidity measure, LM12- the standardized turnover-adjusted number of zero daily trading volumes over prior 12 months. Based on the sort, stocks are divided into 10 groups. The breakpoints are determined based on all stocks listed on NYSE, AMEX, and NASDAQ. Low LM12 group is more liquid than high LM12 group. Relative day 0 is the announcement day. Day -10 and day 10 are 10 days before and 10 days after announcement day, respectively. The estimation period is from day -40 to day -11. T-statistics are used to test the null hypothesis that the number is not different from zero. ***, **, and * indicate that a number is significant different from zero at 1%, 5%, and 10%, respectively, from a two-tailed T test.

	1 Low LM12 (Liquid)	2	3	4	5	6	7	8	9	10 High LM12 (Illiquid)	10−1
# OBS	31663	32028	32126	31909	29938	26748	24133	21423	18325	11816	
(-10, -2)	1.00%***	0.48%***	0.28%***	0.29%***	0.21%***	0.42%***	0.92%***	1.14%***	1.46%***	1.15%***	**0.15%**
-1	0.27%***	0.18%***	0.12%***	0.11%***	0.12%***	0.18%***	0.31%***	0.32%***	0.24%***	0.38%***	**0.11%***
0	-0.05%	0.00%	0.06%**	0.08%***	0.14%***	0.13%***	0.33%***	0.37%***	0.67%***	0.83%***	**0.88%*****
1	-0.39%***	-0.10%***	-0.08%***	0.04%	0.00%	0.00%	-0.01%	0.10%**	0.26%***	0.30%***	**0.69%*****
(2, 10)	0.03%	0.18%***	0.19%***	0.29%***	0.45%***	0.37%***	0.38%***	0.77%***	0.91%***	1.32%***	**1.29%*****
(0, 2)	-0.49%***	-0.10%*	-0.01%	0.15%***	0.20%***	0.16%***	0.33%***	0.57%***	1.11%***	1.42%***	**1.91%*****

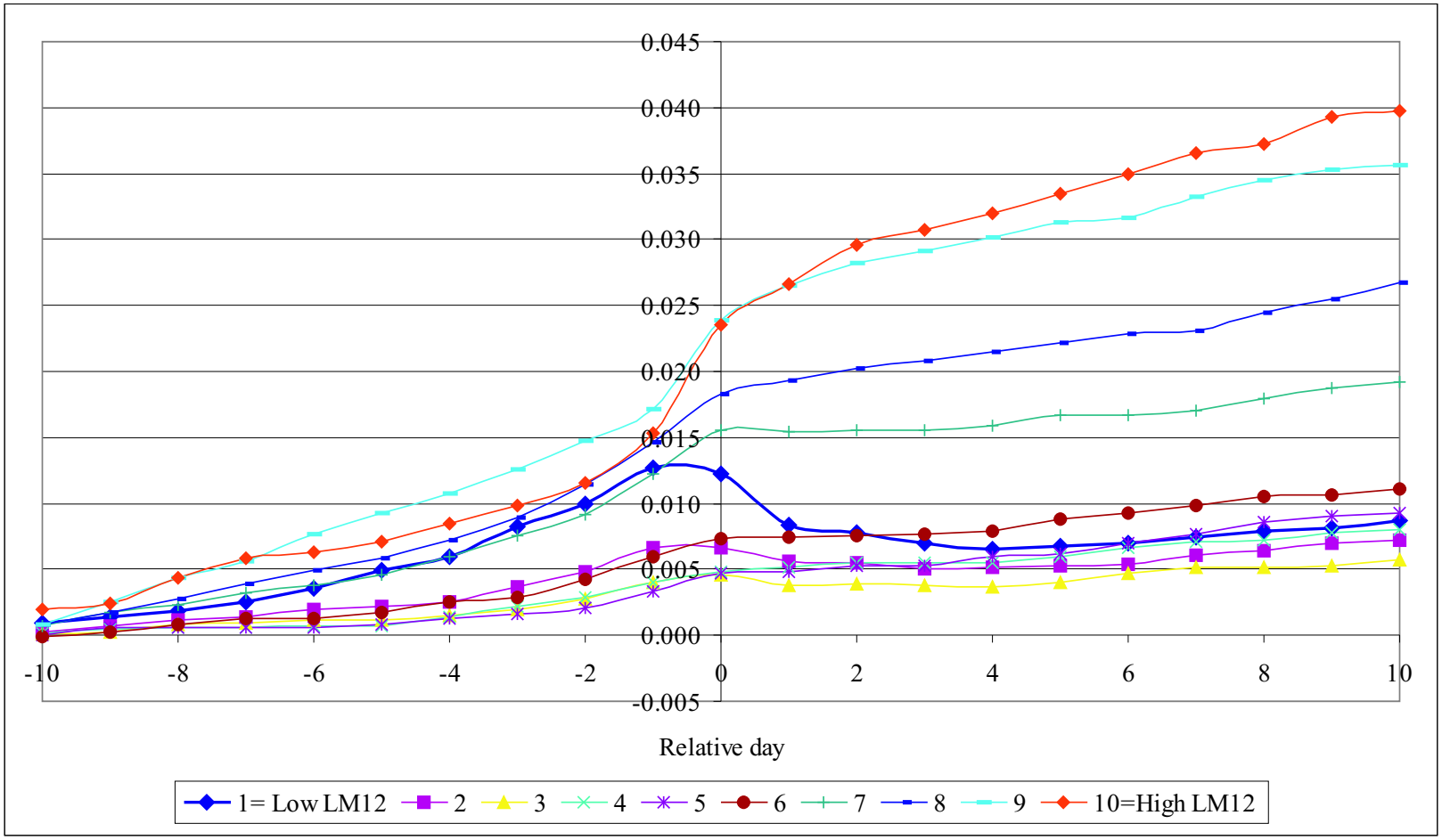

Figure 1: Cumulative Abnormal Return during Quarterly Earnings Announcement Period

This figure shows the cumulative abnormal returns during quarterly earnings announcement periods. Sample includes 260,109 quarterly announcements of firms listed on NYSE/AMEX/NASDAQ from 1982 to 2004. The abnormal return is calculated based on Fama and French 3-factor model. The cumulative abnormal return is the sum of abnormal return since day -10.

decrease significantly. This pattern is particularly obvious for stocks with the lowest LM12. In the lowest LM12 decile, the cumulative abnormal returns increase significantly from day -7 to day -1. The increase in return during this period is about 1%. However, after the announcements, returns drop significantly by 0.5%. This return path indicates that traders speculate in the upcoming news releases of low-LM12 stocks. Since we do not observe similar pattern for high-LM12 stocks, the evidences from Table 2 and Figure 1 are consistent with the hypothesis that low-LM12 stocks have more speculative trading and are more overvalued than high-LM12 stocks.

5.2 Robustness Check for Abnormal Return

In this section, we provide various robustness checks for the first hypothesis. For each robustness check, we sort all stocks in CRSP based on LM12 each year and divide all stocks in CRSP into 3 groups. Then we sort our sample based on a control variable and also divide the sample into three groups. The sort of LM12 is independent of the sort of any control variable. In the following subsections, we test whether low-LM12 stocks earn a lower abnormal return than high-LM12 stocks around quarterly earnings announcements after controlling for size and book-to-market, investors' misperceptions of future earnings, information available and quality of information, changes of liquidity, and for changes in risk. We also investigate whether our results still hold when we use market-adjusted return as the abnormal return, when we include only NYSE/AMEX stocks, and when we exclude announcements without trade on day -2. In the last robustness test, we do the subperiod analysis which separates the Internet bubble period from the non-bubble period.

5.2.1 Control for Size and Book-to-Market

Large firms usually have more analysts following and media coverage than small firms. They also often disclose relevant information to investors voluntarily (see Atiase (1985)). Accordingly, the fundamental value of large firms are more transparent than that of small firms. Investors have more accurate valuation for large firms than for small firms. Because the valuation of small firms are more subjective than that of large firms, according to Baker and Wurgler (2006), when investor sentiment is high, small firms tend to have more speculative trading than large firms.

In this subsection, we control for firm size in our tests. The results are shown in Panel A of Table 3 and Figure 2. We find small firms tend to have high LM12. For small firms, the number of announcements from high-LM12 firms is 26,517 larger than the number of announcements from low-LM12 firms. On the contrary, large firms tend to have low LM12. For large firms, there are 70,586 announcements from low-LM12 firms but only 3,760 announcements from high-LM12 firms. Investigating the differences of abnormal returns between low-LM12 stocks and high-LM12 stocks, we find, for small and median firms, the abnormal returns of high-LM12 firms are significantly higher than the abnormal returns of low-LM12 firms right after quarterly earnings announcements.

For large firms, however, the differences of abnormal returns are not significant, which is consistent with prior studies. For example, Liu (2006) finds that the difference in returns between large low-LM12 stocks and large high-LM12 stocks is insignificant. He argues that large firms are liquid and within large stocks, there should not be significant liquidity

Table 3: Robustness Check for Earnings Announcement Effect on Stock Return: Control for Size and Book-to-Market

This table shows the abnormal returns during earnings announcement periods. Sample size varies with the intersection of CRSP and Compustat, and the intersection of CRSP and I/B/E/S Summary Database. The abnormal return is calculated based on Fama and French 3-factor model. Panel A shows the results after controlling for size. At the end of June in each year, all firms are sorted based on size and LM12. Two sorts are independent. Based on the sorts, stocks are divided into 9 groups. The breakpoints are determined based on the universe of all stocks (NYSE/AMEX/NASDAQ). Panel B shows the results after controlling for book-to-market ratio. 9 groups are formed based on book-to-market and LM12. In both panels, T-statistics are used to test the null hypothesis that the number is not different from zero. ***, **, and * indicate that a number is significant different from zero at 1%, 5%, and 10%, respectively, from a two-tailed T test.

Panel A: Control for size

	Small Size				Median Size				Large Size			
	Low LM12	Median	High LM12	High −Low	Low LM12	Median	High LM12	High −Low	Low LM12	Median	High LM12	High −Low
# OBS	6117	11910	32634		28913	38228	21934		70586	46027	3760	
(-10, -2)	2.23%***	2.07%***	1.74%***	**-0.49%***	0.92%***	0.48%***	0.68%***	**-0.25%****	0.25%***	-0.07%**	0.14%	**-0.11%**
-1	0.51%***	0.64%***	0.43%***	**-0.08%**	0.30%***	0.21%***	0.18%***	**-0.13%*****	0.10%***	0.01%	0.05%	**-0.04%**
0	-0.14%	0.41%***	0.78%***	**0.92%*****	-0.13%***	0.14%***	0.34%***	**0.48%*****	0.08%***	0.09%***	0.11%**	**0.03%**
1	-0.84%***	-0.08%	0.21%***	**1.05%*****	-0.43%***	-0.03%	0.14%***	**0.57%*****	0.01%	0.06%***	0.06%	**0.05%**
(2, 10)	0.46%*	1.00%***	1.33%***	**0.87%*****	0.05%	0.30%***	0.34%***	**0.29%*****	0.17%***	0.26%***	0.02%	**-0.15%**
(0, 2)	-1.01%***	0.39%***	1.21%***	**2.21%*****	-0.69%***	0.11%***	0.54%***	**1.23%*****	0.12%***	0.21%***	0.19%**	**0.07%**

Panel B: Control for book-to-market

	Growth				Neutral				Value			
	Low LM12	Median	High LM12	High −Low	Low LM12	Median	High LM12	High −Low	Low LM12	Median	High LM12	High −Low
# OBS	42833	24638	6961		34100	37404	17862		18540	25889	28191	
(-10, -2)	0.75%***	0.43%***	1.26%***	**0.51%****	0.41%***	0.25%***	0.99%***	**0.58%*****	0.40%***	0.70%***	1.41%***	**1.01%*****
-1	0.22%***	0.21%***	0.35%***	**0.13%***	0.16%***	0.12%***	0.25%***	**0.09%****	0.18%***	0.23%***	0.31%***	**0.13%*****
0	-0.09%***	0.06%	0.42%***	**0.51%*****	0.08%***	0.14%***	0.53%***	**0.45%*****	0.09%*	0.29%***	0.68%***	**0.60%*****
1	-0.24%***	-0.04%	0.01%	**0.25%****	-0.06%**	0.06%**	0.07%*	**0.13%****	-0.16%***	0.01%	0.27%***	**0.43%*****
(2, 10)	0.08%	0.36%***	0.57%***	**0.49%*****	0.26%***	0.32%***	0.52%***	**0.27%*****	0.16%*	0.38%***	1.05%***	**0.90%*****
(0, 2)	-0.36%***	0.07%	0.42%***	**0.78%*****	0.03%	0.22%***	0.71%***	**0.68%*****	-0.08%	0.29%***	1.12%***	**1.21%*****

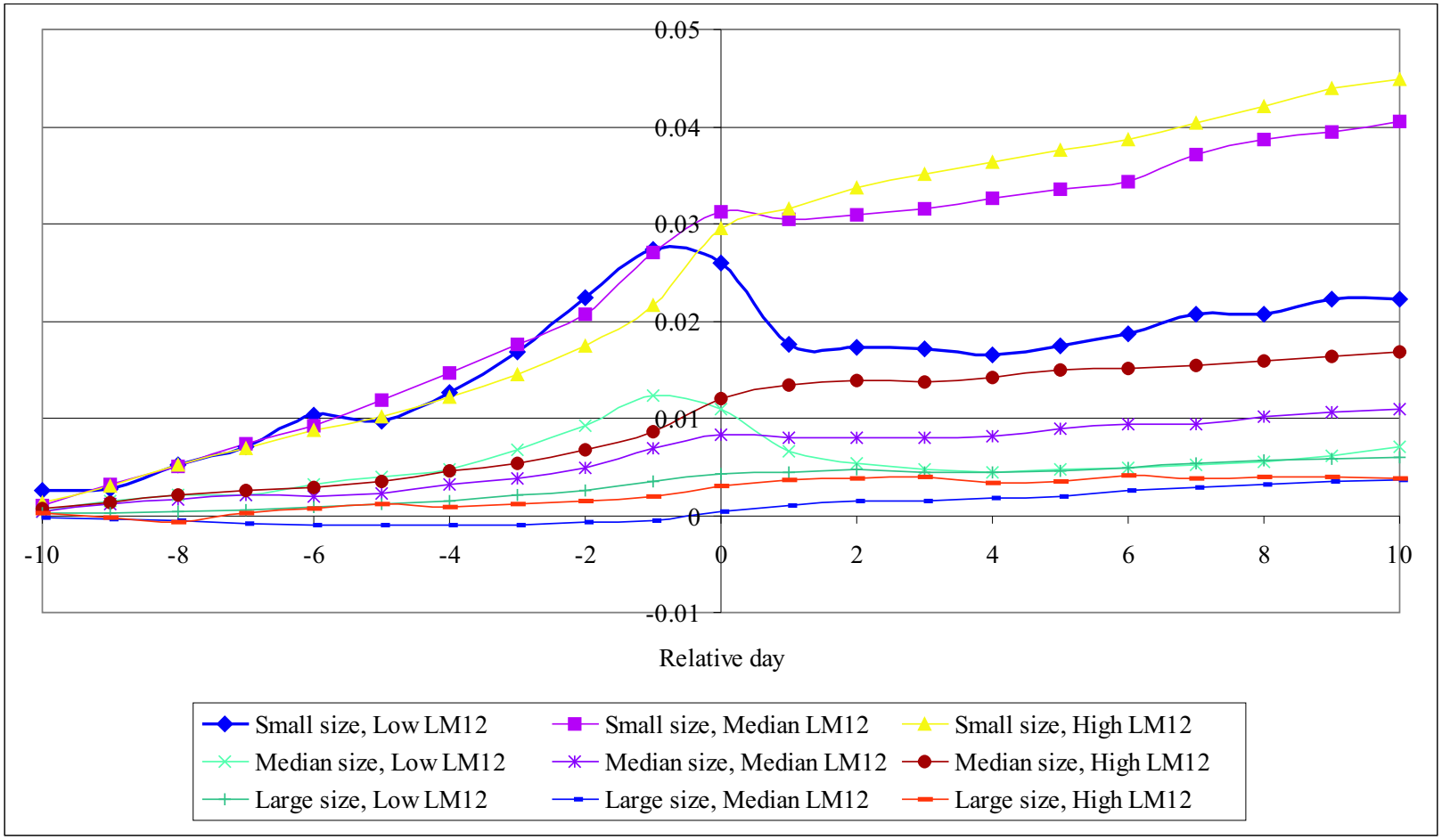

Figure 2: Cumulative Abnormal Return during Quarterly Earnings Announcement Period: Control for Size

This figure shows the cumulative abnormal return during quarterly earnings announcement periods after controlling for firm size. Sample includes quarterly announcements of firms listed on NYSE/AMEX/NASDAQ from 1982 to 2004 The abnormal volume is calculated from Fama and French 3-factor model. The cumulative abnormal return is the sum of abnormal return since day -10.

premiums. Similarly, Neal and Wheatley (1998) find a positive relation between close-end mutual fund discounts and expected returns on small firms, but no relation between the discounts and expected returns on large firms. Also, Baker and Wurgler (2006) find that when the market-wide sentiment index changes from positive to negative, the subsequent returns on the smallest size decile change from 0.73% to 2.37% per month; while the returns on the largest size decile change only slightly from 0.98% to 0.92%. Both Neal and Wheatley (1998) and Baker and Wurgler (2006) argue that large firms are less affected by investor sentiment than small firms. In hypothesis one, we state that liquid stocks tend to have more speculative trading and thus are more overvalued than illiquid stocks. Because large firms are usually less mispriced and are not attractive to speculators, it is not surprising that we do not find significant results for large firms.

From Figure 2, we find investors of small and median low-LM12 firms speculate in the upcoming events prior to the news release, especially for small firms. The cumulative abnormal return for small low-LM12 stocks is 2.39% from day -10 to day 10. From day -10 to day -1, it increases by 2.7%. After the announcements, the abnormal return drops by about 1% during the period from day 0 to day 5. The increase in returns before the quarterly announcements and decrease in returns after the announcements indicate that prior to the quarterly earnings announcements, small low-LM12 firms have significant speculative trading.

In panel B of Table 3, we report the results after controlling for book-to-market ratios. La Porta et al. (1997) find that the announcement returns of value stocks are higher than the announcement returns of glamour stocks because earnings surprises are systematically

more positive for value stocks. Lee and Swaminathan (2000) also provide evidences that the analysts' growth forecasts for value stocks are more pessimistic than glamour stocks, which results in future upward revision of growth forecasts and significant positive returns of future earnings announcements. In Table 1, we show that low-LM12 stocks tend to be growth stocks and high-LM12 stocks tend to be value stocks. To see whether our results are driven by the effect of different book-to-market ratios, we divide our sample into 3 groups, growth, neutral, and value stocks, and test our hypothesis within each group.

Our results show that the differences of abnormal returns between high-LM12 stocks and low-LM12 stocks are all significant positive in all 3 book-to-market groups right after the announcements. The difference of cumulative abnormal returns between high-LM12 and low-LM12 stocks from day 0 to day 2 is 0.78% for growth stocks and 1.21% for value stocks. From Figure 3, we find that low-LM12 growth stocks and low-LM12 value stocks tend to have speculative trading before quarterly earnings announcements, which supports that liquid stocks do have the bundle of salient characteristics that attract speculative investors. The effect is more strong for low-LM12 growth stocks than for low-LM12 value stocks, which is consistent with Baker and Wurgler (2006), who argue that growth stocks are affected by investors' speculative demand more than value stocks.

5.2.2 Control for Misperceptions of Future Earnings

Prior studies show that the return around earnings announcements is related to investors' misperceptions of future earnings. La Porta (1996) documents that analysts' estimates of long-term growth show systematic errors. He finds that the one-year raw return of high expected growth stocks is 20% lower than that of low expected growth stocks.

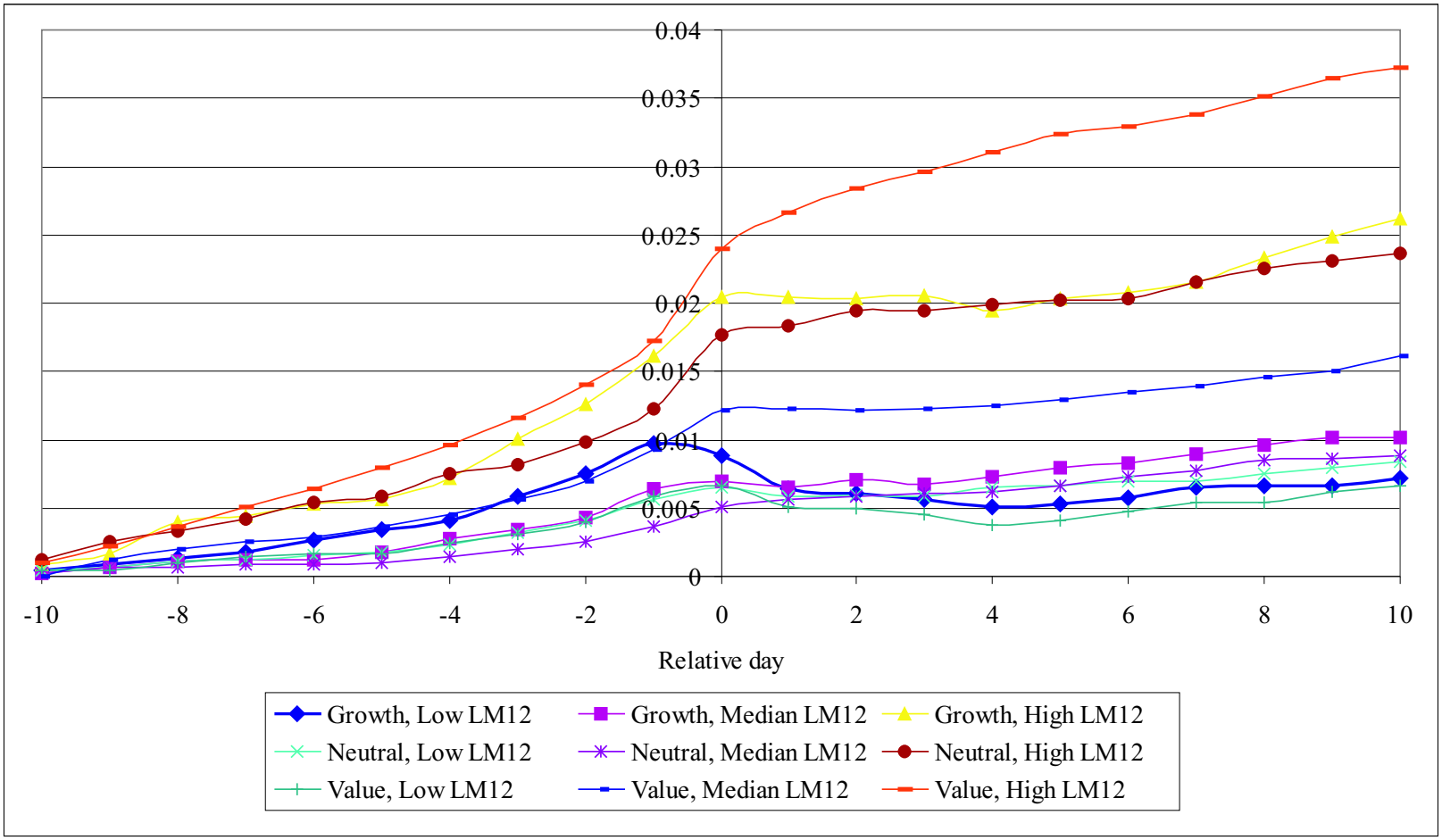

Figure 3: Cumulative Abnormal Return during Quarterly Earnings Announcement Period: Control for Book-to-Market

This figure shows the cumulative abnormal return during quarterly earnings announcement periods after controlling for book-to-market. Sample includes quarterly announcements of firms listed on NYSE/AMEX/NASDAQ from 1982 to 2004. The abnormal volume is calculated from Fama and French 3-factor model. The cumulative abnormal return is the sum of abnormal volume since day −10.

Furthermore, the excess return of earnings announcements is significant negative for high expected growth stocks and positive for low expected growth stocks. He concludes that analysts' growth forecasts are too extreme so that following the earnings announcements, analysts and investors both correct the biased forecasts. Lee and Swaminathan (2000) also find that trading volume seems to provide information about investors' misperceptions of future earnings. Analysts are more optimistic for the future performance of high volume stocks and provide higher long-term growth forecasts for high volume stocks than for low volume stocks. However, low volume firms experience significantly better future operating performance (measured by ROE). Because investors and analysts are too optimistic about future earnings growth of high volume firms, they would revise their misperceptions during the subsequent quarterly earnings announcements. As a result, high volume firms have lower announcement returns than low volume firms.

This study differs from Lee and Swaminathan (2000) in that we focus on the effect of overconfident investors' speculative trading on the return of quarterly earnings announcements, rather than the effect of investors' misperceptions of future earnings. Due to short-sale constraints, only overconfident investors whose valuation of a stock is higher than the firm's fundamental value buy the stock and reflect their opinions in the market. Therefore, even if on average investors and analysts correctly forecast future earnings (that is, investors do not have misperceptions of future earnings), the existence of the irrational overconfident investors can still make liquid stocks overpriced. Because the returns of quarterly earnings announcements capture both the effect of overconfident investors' speculative trading on stock prices and investors' misperceptions of future earnings, in this subsection we examine

whether the speculative trading still affects the announcement returns after controlling for investors' misperceptions of future earnings.

We control two measures of investors' misperceptions: errors of analysts' earnings forecasts and revisions of long-term growth forecasts. Both measures are obtained from I/B/E/S summary database. I/B/E/S summary files compile analysts' forecasts on the third Thursday every month. If a quarterly announcement is made after the third Thursday of a month, we define the forecast error as the actual earnings per share minus the consensus forecast in the month of the announcement. If an announcement is made before the third Thursday of a month, the forecast error is calculated as the actual earnings per share minus analysts' forecasts in the month before the announcement. For announcements made from July year t to June year $t+1$, the forecast error is deflated by the stock price at end of June year t. A positive (negative) forecast error indicates a positive (negative) information shock of an announcement. The revision of long-term growth forecasts is defined as the growth forecast right after the quarterly announcements minus the growth forecast right before the quarterly announcements. If the earnings announcements contain information about future earnings growth, after the announcement over-optimistic analysts should revise their growth forecasts. Because we study the announcement returns during a very short event window rather than the long-term performance, we only focus on the revision made right after the earnings announcements. It is less likely that the 3-day event window of an earnings announcement also reflect the analysts' revision several months after the announcements.

Panel A of Table 4 and Figure 4 present the results after controlling for forecast errors. We find for all three types of information shocks, the differences of abnormal returns

Table 4: Robustness Check for Earnings Announcement Effect on Stock Return: Control for Misperceptions of Future Earnings

This table shows the abnormal returns during earnings announcement periods. Sample size varies with the intersection of CRSP and I/B/E/S Summary Database. The abnormal return is calculated based on Fama and French 3-factor model. Panel A shows the results after controlling for the analyst forecast errors of the announcement. Forecast error is defined as the actual earnings per share (EPS) minus the last consensus of analysts forecast, deflated by the stock price at end of June in the previous year. Firms are sorted based on the forecast error and are divided into 3 groups: positive shock (when the last consensus before the announcement is much lower than the actual EPS), Neutral shock (when the last consensus before the announcement is close to the actual EPS), and negative shock (when the last consensus before the announcement is much higher than the actual EPS). Panel B controls for the revision of the long-term growth forecasts. Revisions of the long-term growth forecasts are defined as the estimates of long-term growth right after the announcement minus the estimates right before the announcement (Growth). Firms are divided into 3 groups based on the direction of revisions: upward revision, no revision, and downward revision. In both panels, T-statistics are used to test the null hypothesis that the number is not different from zero. ***, **, and * indicate that a number is significant different from zero at 1%, 5%, and 10%, respectively, from a two-tailed T test.

Panel A: Control for forecast error

	Positive Shock				Neutral Shock				Negative Shock			
	Low LM12	Median	High LM12	High −Low	Low LM12	Median	High LM12	High −Low	Low LM12	Median	High LM12	High −Low
# OBS	28829	21317	7214		35009	23171	4436		27143	22178	7507	
(-10, -2)	1.59%***	1.18%***	1.68%***	**0.09%**	0.58%***	0.22%***	0.63%***	**0.05%**	-0.67***%	-0.62%***	0.04%	**0.71%***
-1	0.54%***	0.41%***	0.51%***	**-0.02%**	0.14%***	0.09%***	0.13%**	**-0.01%**	-0.17%***	-0.10%**	0.08%	**0.24%***
0	1.05%***	1.09%***	1.64%***	**0.59%***	0.08%***	0.14%***	0.40%***	**0.32%***	-1.06%***	-0.76%***	-0.69%***	**0.37%***
1	0.59%***	0.64%***	0.67%***	**0.08%**	0.02%	0.07%***	0.14%**	**0.13%***	-1.00%***	-0.52%***	-0.41%***	**0.59%***
(2, 10)	0.27%***	0.74%***	0.89%***	**0.62%***	0.15%***	0.30%***	0.41%***	**0.25%***	0.02%	-0.08%	0.07%	**0.05%**
(0, 2)	1.68%***	1.87%***	2.49%***	**0.81%***	0.09%**	0.24%***	0.55%***	**0.46%***	-2.13%***	-1.34%***	-1.14%***	**0.99%***
Error	0.0130***	0.0090***	0.0208**	**0.0078**	0.0001***	0.0001***	0.0001***	**0.0000***	-0.0559***	-0.0427***	-0.0364***	**0.0195**

Panel B: Control for revision of long-term growth

	Downward Revision				No Revision				Upward Revision			
	Low LM12	Median	High LM12	High −Low	Low LM12	Median	High LM12	High −Low	Low LM12	Median	High LM12	High −Low
# OBS	24191	11879	1485		41068	35915	9840		17621	9164	763	
(-10, -2)	0.13%*	-0.17%**	0.35%	**0.22%**	0.63%***	0.22%***	0.75%***	**0.13%**	0.70%***	0.33%***	1.03%***	**0.33%**
-1	0.08%***	0.12%**	0.02%	**-0.05%**	0.20%***	0.10%***	0.28%***	**0.08%**	0.24%***	0.09%***	0.34%**	**0.10%**
0	-0.10%***	-0.04%	0.12%	**0.21%**	0.06%**	0.19%***	0.42%***	**0.36%***	0.30%***	0.31%***	1.09%***	**0.78%***
1	-0.26%***	-0.03%	0.05%	**0.31%**	-0.10%***	0.05%**	0.09%*	**0.19%***	0.28%***	0.27%***	0.46%**	**0.18%**
(2, 10)	0.22%***	0.20%***	0.02%	**-0.20%****	0.15%***	0.31%***	0.52%***	**0.37%***	0.25%***	0.53%***	0.60%*	**0.35%**
(0, 2)	-0.33%***	-0.03%	0.09%	**0.41%***	-0.07%	0.27%***	0.62%***	**0.69%***	0.64%***	0.70%***	1.78%***	**1.14%***
ΔGrowth	-1.63%***	-1.48%***	-3.21%***	**-1.58%***	0.00%	0.00%	0.00%	**0.00%**	1.42%***	1.36%***	3.00%***	**1.58%***
Growth	19.83%	15.42%	18.13%	**-1.70%***	19.42%	15.27%	16.03%	**-3.39%***	17.31%	13.43%	15.23%	**-2.08%***

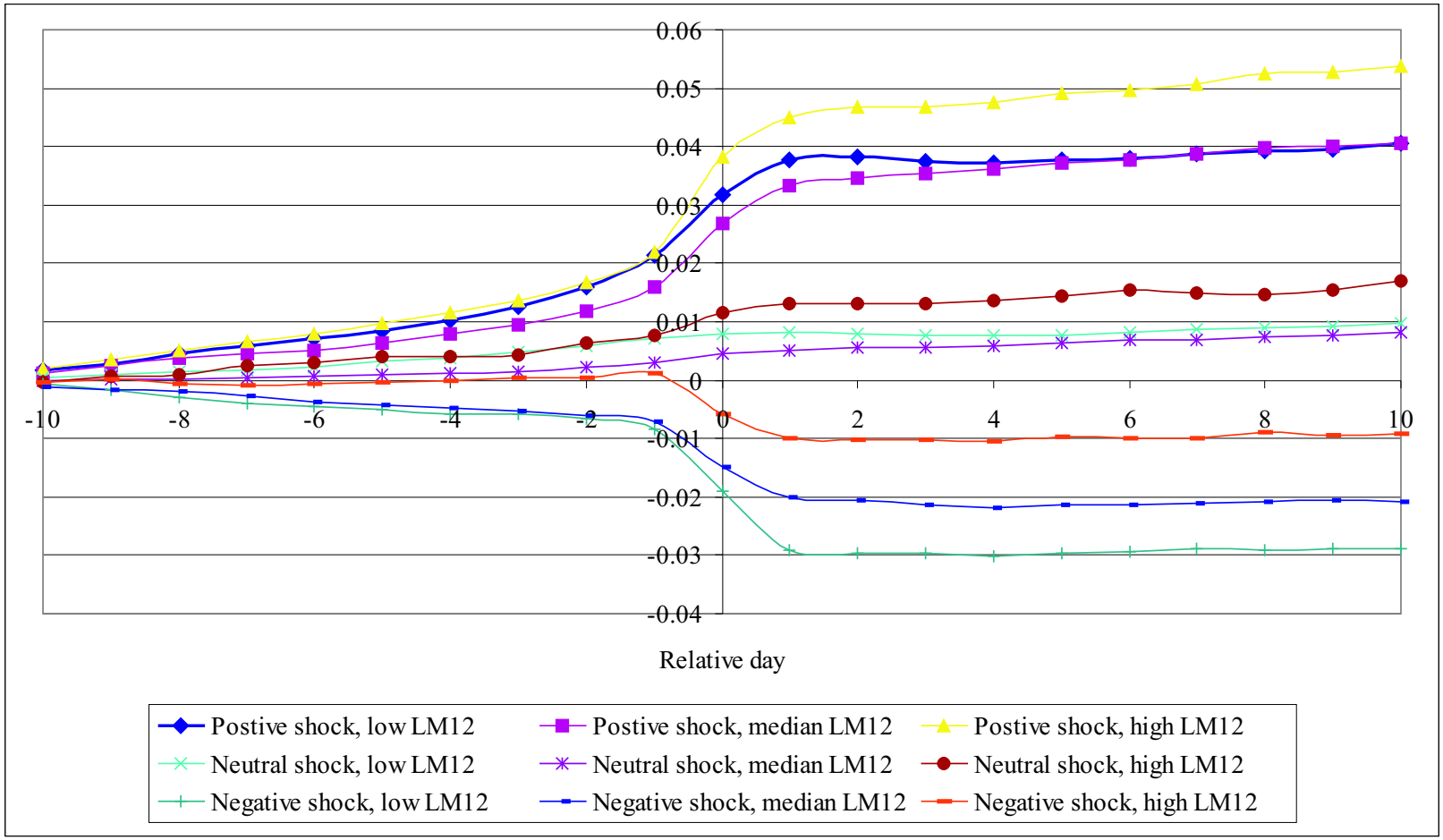

Figure 4: Cumulative Abnormal Return during Quarterly Earnings Announcement Period: Control for Forecast Error

This figure shows the cumulative abnormal return during quarterly earnings announcement periods after controlling for analysts forecast error. Sample includes quarterly announcements of firms listed on NYSE/AMEX/NASDAQ from 1984 to 2004. The abnormal return is calculated from Fama and French 3-factor model. The cumulative abnormal return is the sum of abnormal return since day −10. Positive (negative) shock is the announcement when the actual EPS is much higher (lower) than analysts' forecast.

between high-LM12 groups and low-LM12 groups are all significant during the period (0, 2). The effect is more pronounced for announcements with negative shocks than for announcements with positive or neutral shocks. However, after investigating the magnitude of forecast errors, we find that analysts tend to be less optimistic for high-LM12 stocks than for low-LM12 stocks, especially for negative events. In positive events, analysts, on average, underestimate the earnings per share by 1.30 percent of stock prices for low-LM12 stocks and by 2.08 percent for high-LM12 stocks. Similarly, in negative events, they overestimate earnings by 5.59 percent of stock prices for low-LM12 stocks and by 3.64 percent for high-LM12 stocks. Because analysts' forecasts before the announcements are more optimistic for low-LM12 stocks than for high-LM12 stocks, the lower abnormal returns for low-LM12 stocks may also result from analysts' biased estimates. Although our results may be partially driven by the analysts' optimism about low-LM12 stocks, we believe speculative trading as reflected in LM12 also has significant effects on the abnormal returns. The difference of forecast errors between high-LM12 and low-LM12 stocks is not significant in both of the positive events and negative events. In the neutral events, the difference is significant statistically at 1% level but not significant economically because its magnitude is less than 0.01% of stock prices. Considering that the abnormal returns between high-LM12 and low-LM12 stocks are all significant at 1% in all three types of events, we think that the results are unlikely to be caused solely by analysts' forecast errors.

In panel B of Table 4 and Figure 5 we report the results after controlling for the revisions of growth forecasts. The total number of announcements is only 151,926 because

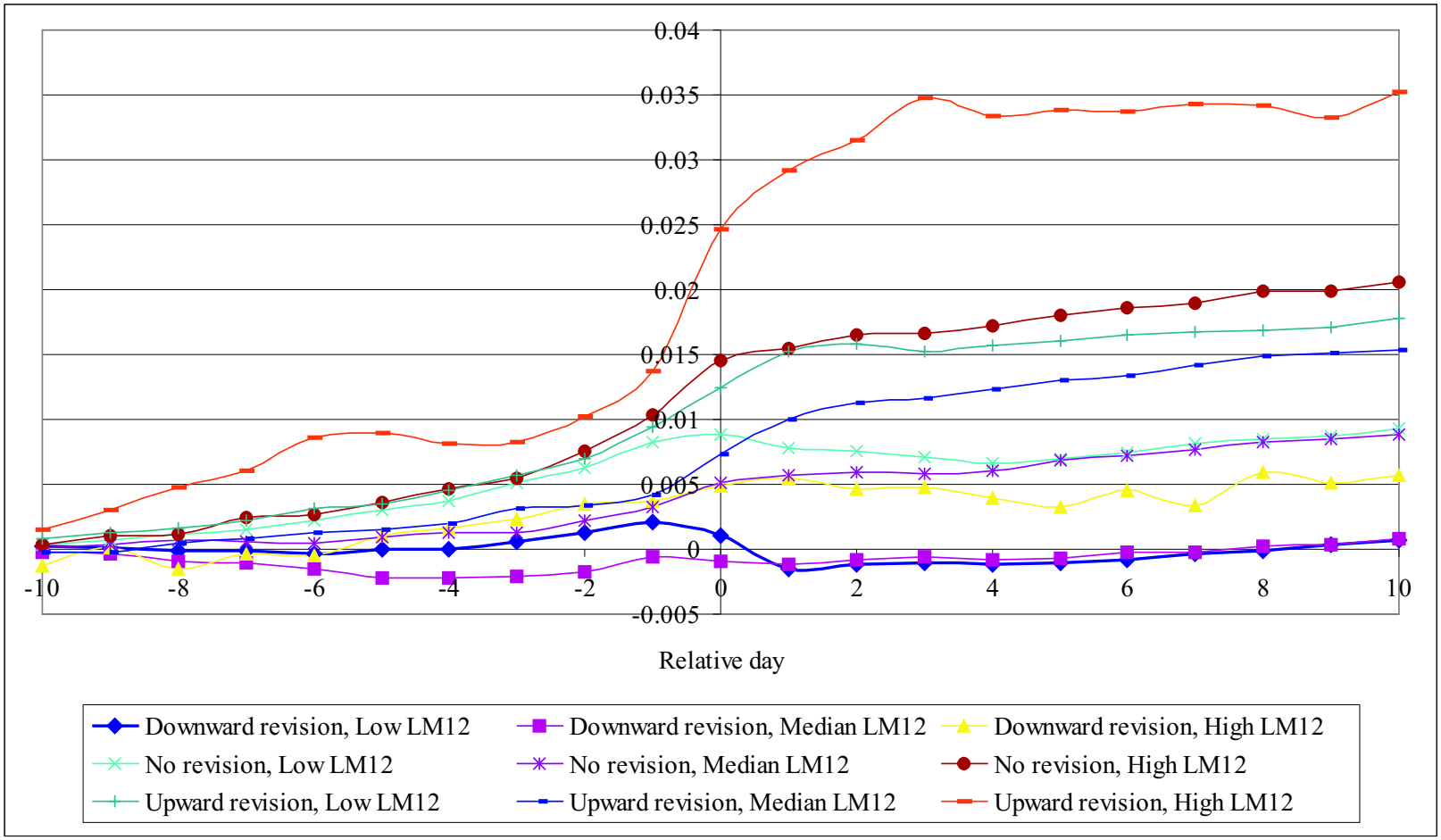

Figure 5: Cumulative Abnormal Return during Quarterly Earnings Announcement Period: Control for Growth Revision

This figure shows the cumulative abnormal return during quarterly earnings announcement periods after controlling for growth revision. Sample includes quarterly announcements of firms listed on NYSE/AMEX/NASDAQ from 1984 to 2004. The abnormal return is calculated from Fama and French 3-factor model. The cumulative abnormal return is the sum of abnormal return since day -10. Growth revision is the difference between analysts' long-term growth forecasts right before and after the announcement.

there are many missing value of analysts' growth forecasts in I/B/E/S. Although the long-term growth forecasts right before the announcements for low-LM12 stocks are significant higher than the forecasts of high-LM12 stocks (by 1.70% for announcements with downward revisions, 3.39%for announcements with no revisions, and by 2.08% for announcements with upward revisions), the higher growth forecasts for low-LM12 stocks do not necessarily mean that analysts are more over-optimistic for low-LM12 stocks than for high-LM12 stocks. For both low-LM12 and high-LM12 stocks, downward revisions occur more frequently than the upward revisions. Among all 151,926 announcements, 82,880 announcements are from low-LM12 firms. About 21.26% of them receive upward revisions and 29.19% receive downward revisions. There are 12,088 announcements from high-LM12 firms. 12.28% of them get downward revisions and 6.30% obtain upward revisions. Therefore, in our sample, high-LM12 stocks still receive many downward revisions and low-LM12 stocks also get many upward revisions. Furthermore, the magnitude of revisions for high-LM12 stocks are larger than that for low-LM12 stocks, irrespective to the direction of revisions. Based on the directions and magnitude of growth revisions, we do not observe analysts are more over-optimistic about future earnings growth for low-LM12 stocks than for high-LM12 stocks.

Because the abnormal returns for the announcements with downward revisions and the announcements with upward revisions also reflect the effect of changes of growth forecasts, we focus on the announcements without any revision. Among the 151,926 announcements, more than 50% do not have any revision of long-term growth forecasts. The differences of cumulative abnormal returns between high-LM12 stocks and low-LM12 stocks during the event period (0, 2) is 0.69% and is significant at 1% level.

Our results in this subsection indicate that the differences of abnormal returns between high-LM12 and low-LM12 stocks do not solely result from investors' misperceptions of future earnings. Although analysts' earnings forecasts are more optimistic for low-LM12 stocks, the differences of forecast errors between high-LM12 and low-LM12 stocks are not significant for positive and negative events. Investigating the revisions of long-term growth forecasts, we find that both high-LM12 and low-LM12 stocks receive more downward revisions than upward revisions right after quarterly announcements and that analysts are not much more over-optimistic about future earnings growth for low-LM12 stocks than for high-LM12 stocks. The fact that our results hold well after controlling for investors' misperceptions suggests that the overconfident investors' speculative trading does affect stock prices.

5.2.3 Control for Information Available, Dispersion in Opinions, and Informativeness of Announcements

In this subsection, we do three robustness tests. The first robustness test controls for information available to investors. We use the number of analysts following to measure information available. Firms with more analysts following usually have more information available to investors. The valuation of these firms is less subjective and investors may have more accurate earnings forecasts. In Table 1, we show that high-LM12 firms are usually low-following firms and low-LM12 firms are usually high-following firms. To rule out the possibility that our results are affected by different amount of information available to investors between high-LM12 and low-LM12 firms, we control for the number of analysts following and redo our tests.

Panel A of Table 5 and Figure 6 provide the results after controlling for the number of analysts following. There are 105,616 announcements from low-LM12 firms. Among these announcements, 34.6% have low analysts following and 37.6% have high analysts following. For the 58,328 announcements from high-LM12 firms, only 0.23% receive high analysts coverage. 95.6% of high-LM12 firms receive low analysts following. For announcements with low and median analysts following, our hypothesis hold well. High-LM12 stocks earn significant larger abnormal returns than low-LM12 stocks. However, for announcements with high analysts following, the result is not significant. The insignificant result may be partially driven by the small sample size for high-LM12 high-following firms. Another possibility is that firms with high analysts following but high LM12 may suffer firm-specific problems such as financial distress. Although they are followed by many analysts, the specific firm problems influence investors' willingness to trade and may also affect the announcement returns.

From Figure 6, we find that low-LM12 low-following stocks tend to have speculative trading before quarterly earnings announcements. Although the information available for these firms is limited, investors still trade frequently. If we resort to an explanation of irrational behavior, we can attribute this phenomenon to the demand of propensity to speculate proposed by Baker and Wurgler (2006). Firms with low analysts following are difficult to price. Because their valuation is very subjective, investors have a wide spectrum of valuations, from much too low to much too high. When the trading of these stocks are very active, the market is dominated by irrational investors and thus the speculative trading for low-following but low-LM12 stocks is prevalent.

Table 5: Robustness Check for Earnings Announcement Effect on Stock Return: Control for Information Available, Dispersion in Opinions, and Informativeness of Announcements

This table shows the abnormal returns during earnings announcement periods. Sample varies with the intersection of CRSP and I/B/E/S Summary Database. The abnormal return is calculated based on Fama and French 3-factor model. Panel A controls for the number of analyst following. Number of analyst following is defined as the number of estimates in I/B/E/S right before the announcements. If the number of analyst following is not available in I/B/E/S, we set it zero. 9 groups are formed based on two independent sorts of the number of analyst following and LM12. Panel B controls for the analysts forecast dispersion. Forecast dispersion is defined as the standard deviation of analysts earnings estimates right before the announcements. Only announcements which have at least two analysts following are included in our sample. 9 groups are formed based on the two independent sorts of the analysts forecast dispersion and LM12. Panel C controls for the changes of return volatility after announcements. The changes of return volatility is defined as the standard deviation of stock return during the period (11, 40) minus the standard deviation of stock return during the period (-40, -11). In all panels, T-statistics are used to test the null hypothesis that the number is not different from zero. ***, **, and * indicate that a number is significant different from zero at 1%, 5%, and 10%, respectively, from a two-tailed T test.

Panel A: Control for analyst following

	Low Following				Median Following				High Following			
	Low LM12	Median	High LM12	High −Low	Low LM12	Median	High LM12	High −Low	Low LM12	Median	High LM12	High −Low
# OBS	36548	61408	55768		29397	20902	2423		39671	13855	137	
(-10, -2)	0.72%***	0.63%***	1.28%***	**0.56%*****	0.61%***	0.12%*	0.27%	**-0.34%**	0.34%***	-0.09%	0.38%	**0.04%**
-1	0.21%***	0.23%***	0.31%***	**0.09%****	0.19%***	0.10%***	0.36%***	**0.17%****	0.14%***	0.01%	-0.49%	**-0.63%***
0	-0.14%***	0.15%***	0.59%***	**0.73%*****	0.07%*	0.20%***	0.24%**	**0.17%**	0.10%***	0.08%**	0.16%	**0.05%**
1	-0.41%***	-0.03%	0.18%***	**0.59%*****	-0.13%***	0.07%**	0.10%	**0.23%****	0.05%*	0.11%***	-0.06%	**-0.10%**
(2, 10)	0.14%**	0.41%***	0.89%***	**0.75%*****	0.13%*	0.28%***	0.53%***	**0.41%****	0.18%***	0.30%***	-0.06%	**-0.24%**
(0, 2)	-0.61%***	0.13%***	0.91%***	**1.52%*****	-0.08%	0.33%***	0.52%***	**0.60%*****	0.17%***	0.26%***	0.11%	**-0.06%**

Panel B: Control for forecast dispersion

	Low Dispersion				Median Dispersion				High Dispersion			
	Low LM12	Median	High LM12	High −Low	Low LM12	Median	High LM12	High −Low	Low LM12	Median	High LM12	High −Low
# OBS	42153	28635	4891		14035	8203	956		24686	12706	1743	
(-10, -2)	0.76%***	0.23%***	0.75%***	**-0.01%**	0.26%***	0.00%	0.61%*	**0.35%**	0.10%	-0.11%	0.17%	**0.07%**
-1	0.23%***	0.15%***	0.27%***	**0.04%**	0.12%***	0.01%	-0.05%	**-0.17%**	0.10%***	0.01%	0.30%***	**0.20%***
0	0.15%***	0.20%***	0.51%***	**0.36%*****	0.04%	0.17%***	0.26%	**0.23%**	-0.08%**	0.05%	0.20%	**0.28%***
1	0.03%	0.09%***	0.12%*	**0.09%**	-0.08%*	0.08%*	0.12%	**0.20%**	-0.23%***	0.00%	0.01%	**0.24%***
(2, 10)	0.24%***	0.38%***	0.44%***	**0.20%**	0.32%***	0.19%**	0.80%**	**0.47%**	-0.08%	0.21%**	0.33%	**0.41%**
(0, 2)	0.19%***	0.33%***	0.70%***	**0.51%*****	-0.02%	0.27%***	0.58%**	**0.60%****	-0.35%***	0.15%**	0.15%	**0.50%****

Table 5 continued

Panel C: Control for changes of return volatility

	Decrease in Volatility				Little Change in Volatility				Increase in Volatility			
	Low LM12	Median	High LM12	High −Low	Low LM12	Median	High LM12	High −Low	Low LM12	Median	High LM12	High −Low
# OBS	35002	28711	20017		36166	36578	16260		33282	29898	20944	
(-10, -2)	1.16%***	0.97%***	2.05%***	**0.89%*****	0.49%***	0.29%***	0.82%***	**0.34%*****	-0.09%	-0.02%	0.75%***	**0.84%*****
-1	0.28%***	0.32%***	0.39%***	**0.11%****	0.15%***	0.12%***	0.26%***	**0.11%*****	0.10%***	0.09%***	0.26%***	**0.15%*****
0	0.15%***	0.27%***	0.80%***	**0.65%*****	0.13%***	0.18%***	0.56%***	**0.42%*****	-0.25%***	0.00%	0.36%***	**0.61%*****
1	-0.06%*	0.10%***	0.25%***	**0.32%*****	0.04%	0.05%**	0.19%***	**0.16%*****	-0.45%***	-0.11%***	0.11%**	**0.56%*****
(2, 10)	0.48%***	0.58%***	1.26%***	**0.79%*****	0.38%***	0.44%***	0.57%***	**0.19%****	-0.41%	0.03%	0.67%	**1.08%*****
(0, 2)	0.10%*	0.39%***	1.25%***	**1.15%*****	0.20%***	0.31%***	0.86%***	**0.66%*****	-0.79%***	-0.15%***	0.58%***	**1.38%*****

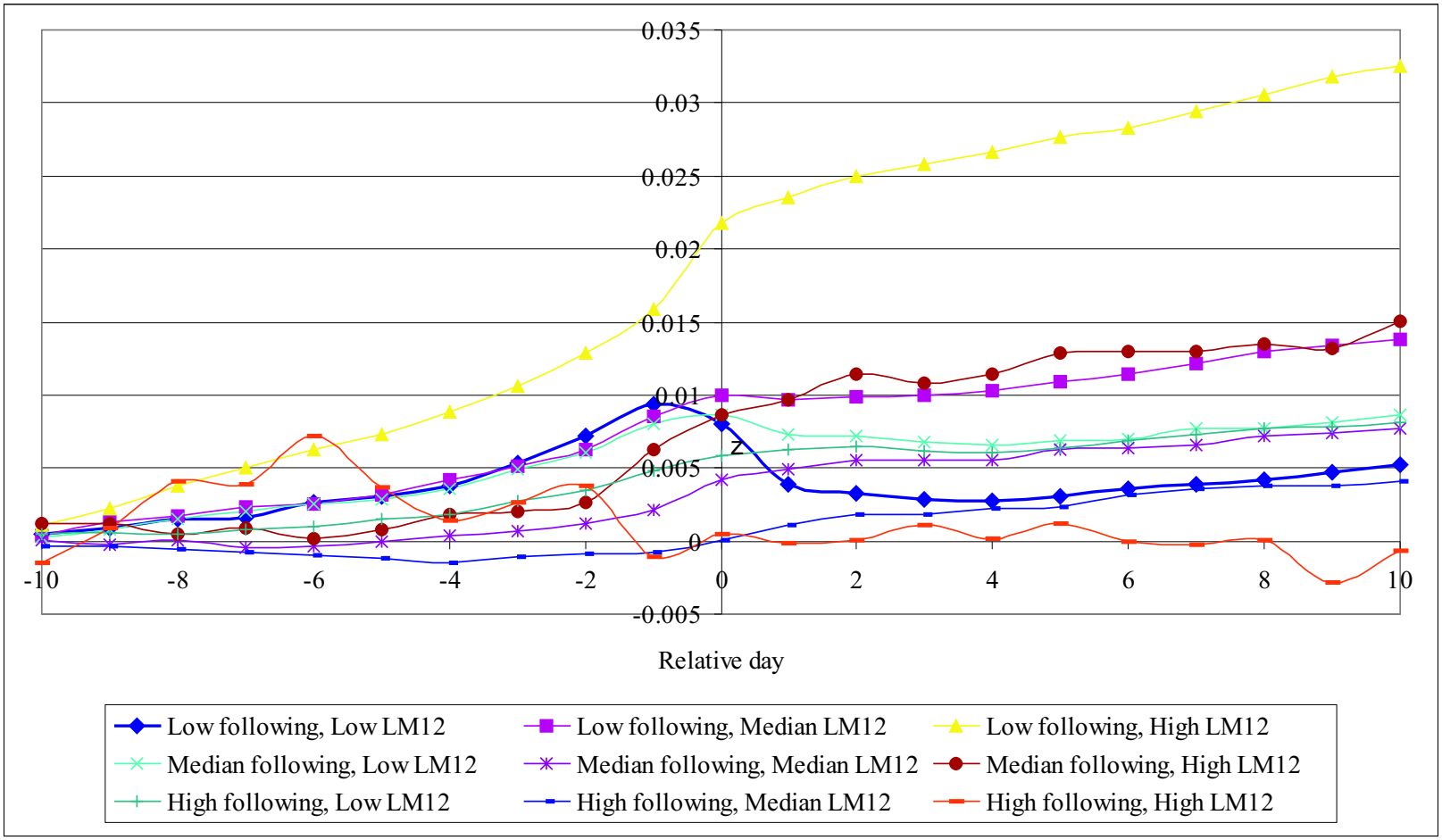

Figure 6: Cumulative Abnormal Return during Quarterly Earnings Announcement Period: Control for Analysts Following

This figure shows the cumulative abnormal return during quarterly earnings announcement periods after controlling for number of analyst following. Sample includes quarterly announcements of firms listed on NYSE/AMEX/NASDAQ from 1982 to 2004. The abnormal return is calculated from Fama and French 3-factor model. The cumulative abnormal return is the sum of abnormal return since day −10.

The second robustness test in this subsection controls for the dispersions in opinions among investors. The dispersions in opinions affect stock returns when short-sale constraints exist. With short-sale constraints, investors with pessimistic views do not trade; while optimistic investors buy stocks and reflect their opinions to the public. Therefore, even if on average investors are rational, short-sale constraints may still result in overpricing. The overpricing is more severe for stocks with larger dispersions in investors' opinions. Diether, Malloy, and Scherbina (2002) find that stocks with higher dispersions in analysts' earnings forecasts tend to be more overvalued and earn lower future returns than otherwise similar stocks. In Diether, Malloy, and Scherbina (2002), investors are rational and the analysts' forecast dispersion is a proxy of the dispersion in opinions.

On the other hand, Scheinkman and Xiong (2003) propose a model in which investors are overconfident. In their model, due to short-sale constraints, investors who buy a stock also obtain an option to sell it in the future. When the difference in beliefs is higher, an overconfident investor expects that he can sell the stock to other overconfident investors who are even more optimistic. As a result, the re-sale option embedded in the stock is more valuable when the dispersion in opinions is higher. In their model, the overconfidence results in differences of beliefs which in turn boosts speculative trading.

To see whether liquidity contains more information than analysts' forecast dispersions, we control for dispersions in opinions. We get the forecast dispersion from I/B/E/S. Because there should be at least two analysts' forecasts for the calculation of forecast dispersions, we lose many observations of high-LM12 stocks which usually have, if any, only one analyst following. The results are presented in panel B of Table 5 and Figure 7.

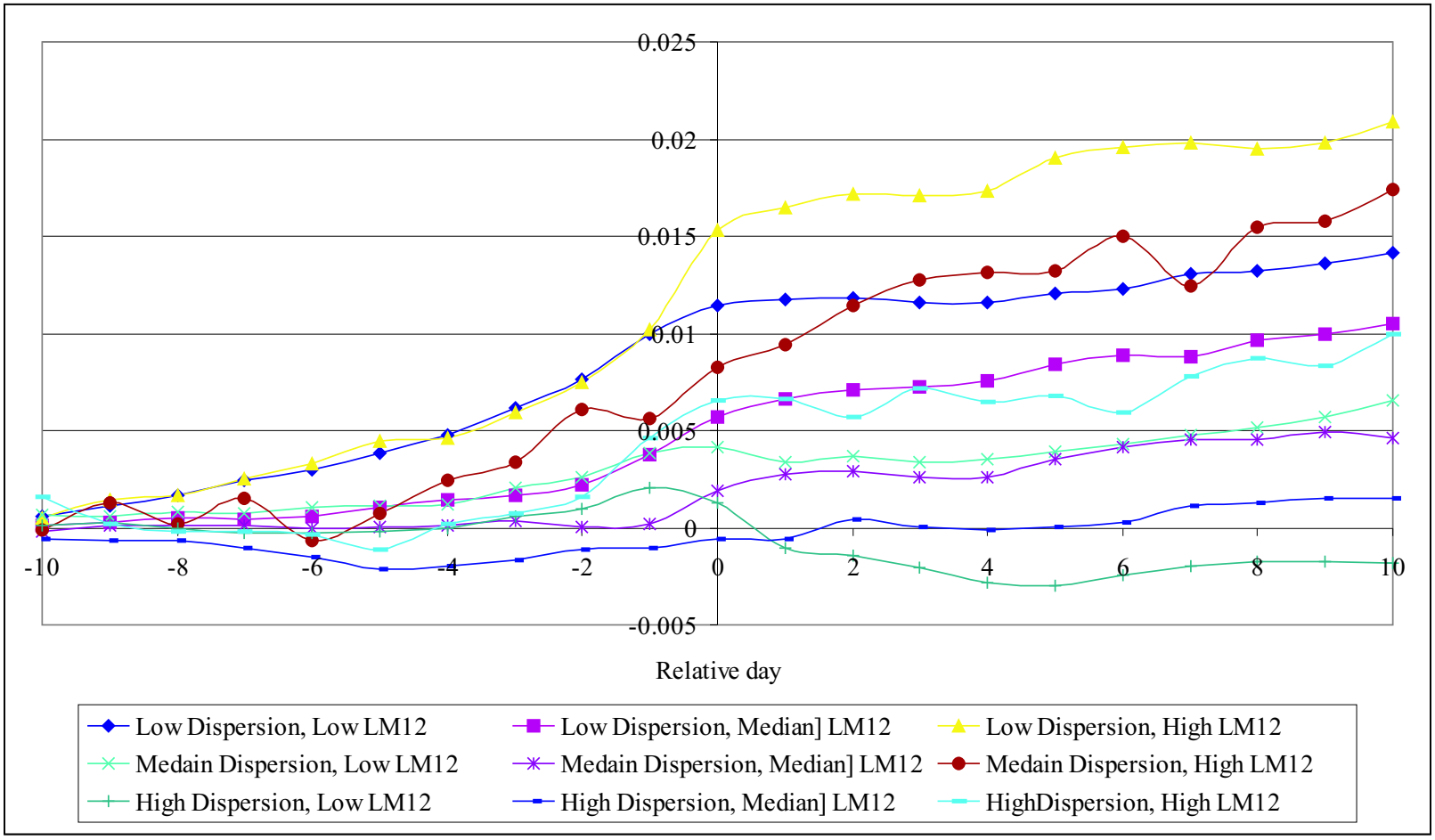

Figure 7: Cumulative Abnormal Return during Quarterly Earnings Announcement Period: Control for Forecast Dispersion

This figure shows the cumulative abnormal return during quarterly earnings announcement periods after controlling forecast dispersion. Sample includes quarterly announcements of firms listed on NYSE/AMEX/NASDAQ from 1984 to 2004. The abnormal return is calculated from Fama and French 3-factor model. The cumulative abnormal return is the sum of abnormal return since day -10. Forecast Dispersion is the standard deviation among all analysts forecasts right before the announcement.

Consistent with our first hypothesis, high-LM12 stocks have significant higher abnormal returns than low-LM12 stocks in all 3 dispersion groups during the period (0, 2). Furthermore, low-LM12 high-dispersion stocks have the lowest abnormal returns among all dispersion-LM12 groups. This result shows that low-LM12 high-dispersion stocks show the highest degree of overpricing so that after the announcements its return is the lowest. Investigating the return path around the announcements in Figure 7, we find that low-LM12 high-dispersion stocks have positive abnormal returns before the announcements and negative abnormal returns after the announcements. If investors are rational and stocks are overpriced before earnings announcements because of the large dispersions of opinion, we should observe an increase in return before and a decrease in return after the announcements for all three high dispersion groups. However, this pattern only exists for high-dispersion low-LM12 stocks. This evidence is consistent with Scheinkman and Xiong (2003) which shows that liquid stocks have higher differences in beliefs and more speculative trading than illiquid stocks.

In the last test of this subsection, we use changes of return volatility to measure the informativeness of announcements. The return volatility can be a proxy for the disagreement of stock prices. If after the announcement, the return volatility does not change (that is, the disagreement remains the same), the announcement may not be very informative. If after the announcement, the return volatility decreases, the announcement is informative because it mitigates the disagreement among different investors. On the contrary, if the return volatility increases after the announcement, the announcement may convey surprises which enlarge the disagreement. We define the changes of return volatility as the standard

deviation of stock returns during the period (11, 40) minus the standard deviation of stock returns during the period $(-40, -11)$[9]. When the announcement is more informative, irrational investors may have larger revision of their mispricing, which magnifies the difference of abnormal returns between high-LM12 and low-LM12 stocks around quarterly earnings announcements.

In Panel C of Table 5 and Figure 8, we provide the results after controlling the changes of return volatility. In all 3 groups, high-LM12 stocks have significant higher abnormal returns than low-LM12 stocks after the announcements. Furthermore, for low-LM12 stocks, the abnormal returns during the period (0, 2) decrease from 0.20% for announcements with little change in volatility to 0.10% for announcements with a decrease in volatility. On the contrary, for high-LM12 stocks, the abnormal returns increase from 0.86% for announcements with little change in volatility to 1.25% for announcements with a decrease in volatility. If the decrease in volatility is a good news for investors, the return for the announcements with decrease in volatility should be higher than the return for the announcements with little change in volatility. The fact that low-LM12 stocks with a decrease in volatility show lower returns than low-LM12 stocks with little change in volatility support the argument that overconfident investors correct their mispricing more for informative announcements than for non-informative announcements.

For the announcements with an increase in volatility, the difference between high-LM12 and low-LM12 stocks is the highest among three groups. For low-LM12 stocks,

[9]The results are similar when we define the changes of return volatility as the standard deviation of stock returns during the period (11, 20) minus the standard deviation of stock returns during the period $(-20, -11)$.

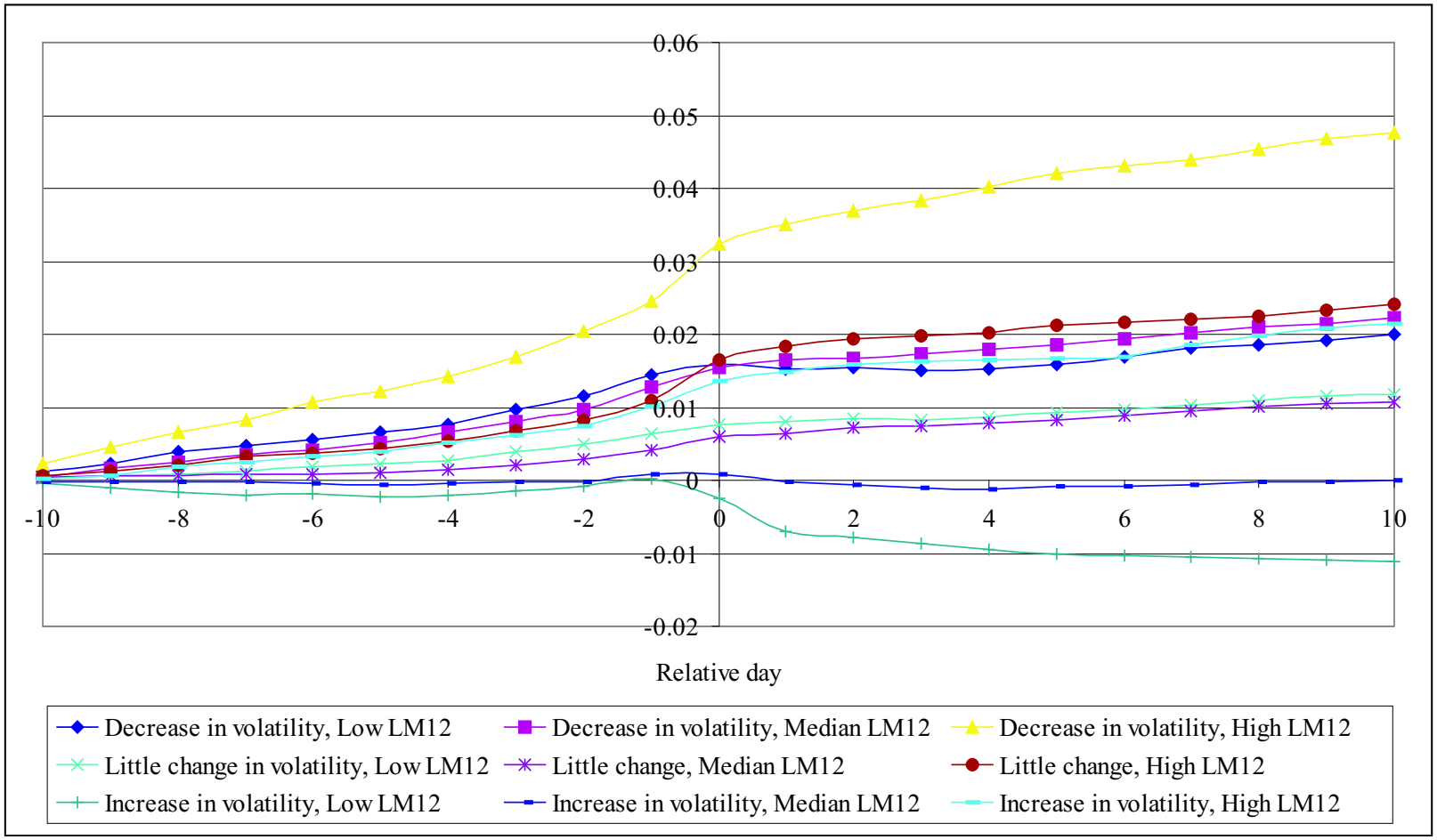

Figure 8: Cumulative Abnormal Return during Quarterly Earnings Announcement Period: Control for Change in Volatility

This figure shows the cumulative abnormal return during quarterly earnings announcement periods after controlling forecast dispersion. Sample includes quarterly announcements of firms listed on NYSE/AMEX/NASDAQ from 1984 to 2004. The abnormal return is calculated from Fama and French 3-factor model. The cumulative abnormal return is the sum of abnormal return since day -10. The changes of return volatility is defined as the standard deviation of stock return during the period (11, 40) minus the standard deviation of stock return during the period $(-40, -11)$.

the abnormal returns change from 0.20% for announcements with little change in volatility to -0.79% for announcements with an increase in volatility. For high-LM12 stocks, the abnormal returns decrease from 0.86% for announcements with little change in volatility to 0.58% for announcements with an increase in volatility. Apparently, investors of low-LM12 stocks are more surprised at the increase in volatility than investors of high-LM12 stocks. If we view the increase in volatility as a bad news, low-LM12 stocks is more sensitive to bad news than high-LM12 stocks. A possible explanation is that after a bad news is released, overconfident investors are shocked and may correct their mispricing more thoroughly.

5.2.4 Control for Changes of Future Liquidity

Liquid (illiquid) stocks are usually more likely to experience a liquidity deterioration (improvement) in the future. If the earnings announcements contain information which affects the future liquidity of a stock, the announcement effects may be affected by the information about changes of future liquidity. Hence, the low (high) announcement return of low-LM12 (high-LM12) stocks may result from the information about liquidity downgrade (upgrade) from the quarterly announcements. In this subsection, we control for changes of future liquidity after the announcements. Because the changes of liquidity may be affected by other events which occur after the earnings announcements, rather than by the information conveyed by earnings announcements per se, an upgrade (downgrade) of liquidity in the future is not necessarily related to a higher (lower) announcement returns.

We define the upgrade/downgrade of liquidity based on the movement of stocks from one LM12 decile to another. For any quarterly announcement made by a firm between July year t and June year $t+1$, if that firm moves from a lower (higher) LM12 decile

to a higher (lower) LM12 decile from the end of June year t to June year $t+1$, we assign it into the liquidity downgrade (upgrade) group. The results are shown in Table 6 and the graphical summaries are presented in Figure 9. Again high-LM12 stocks still earn higher abnormal returns than low-LM12 stocks during the period (0, 2) for all liquidity-downgrade, liquidity-upgrade, and liquidity-same groups. Furthermore, for both high-LM12 and low-LM12 stocks, we find, in general, the abnormal returns in downgrade groups are lower than their counterparts in upgrade groups. This indicates that the earnings announcements may convey information about changes of future liquidity. Investors may either perceive the future changes and require a higher (lower) rate of return for liquidity-downgrade (upgrade) stocks, or be discouraged (stimulated) by the information content of the announcements and trade less (more) frequently after the announcements. From Figure 9, we find low-LM12 stocks with future liquidity downgrade tend to have more speculative trading before the announcements. A possible explanation is that investors revise not only their mispricing but also their trading activities for low-LM12 stocks after the announcements. Therefore, stocks with more speculative trading prior to the announcements experience liquidity downgrade after the announcements.

5.2.5 Control for Changes in Risk

Risk potentially may affect the abnormal returns around quarterly earnings announcements. Because the information available for high-LM12 stocks is less than that for low-LM12 stocks, the uncertainty of future performance for high-LM12 stocks may be higher than that of low-LM12 stocks. Therefore, the earnings releases for high-LM12 stocks may resolve investors' concern about risk more significantly than the announcements of

Table 6: Robustness Check for Earnings Announcement Effect on Stock Return: Control for Change of Liquidity

This table shows the abnormal returns during earnings announcement periods. The abnormal return is calculated based on Fama and French 3-factor model. In June year $t-1$ and in June year t, all stocks are grouped into ten portfolios based on the sort of LM12. The breakpoints are calculated from all stocks listed in NYSE, AMEX, and NASDAQ. If, from Jun. year $t-1$ to Jun. year t, firms move from a lower LM12 decile to a higher LM12 decile, they are assigned to the "liquidity upgrade" group. If from year $t-1$ to year t, firms remain in the same decile, they are assigned to the "liquidity same" group. If from year $t-1$ to year t, firms move from a higher LM12 decile to a lower LM12 decile, they are assigned to the "liquidity downgrade". Then at the end June of each year, all firms are assigned into 9 groups based on LM12 and changes of liquidity. The T-statistics are used to test the null hypothesis that the number is not different from zero. ***, **, and * indicate that a number is significant different from zero at 1%, 5%, and 10%, respectively, from a two-tailed T test.

	Liquidity Downgrade				Liquidity Same				Liquidity Upgrade			
	Low LM12	Median	High LM12	High −Low	Low LM12	Median	High LM12	High −Low	Low LM12	Median	High LM12	High −Low
# OBS	38190	28635	12003		47303	34867	27840		15913	28750	14521	
(-10, -2)	0.38%***	0.31%***	0.90%***	**0.52%*****	0.55%***	0.16%***	1.05%***	**0.49%*****	0.77%***	0.72%***	1.67%***	**0.90%*****
-1	0.17%***	0.18%***	0.21%***	**0.03%**	0.15%***	0.09%***	0.27%***	**0.11%*****	0.21%***	0.25%***	0.48%***	**0.27%*****
0	0.03%	0.15%***	0.41%***	**0.38%*****	0.04%	0.13%***	0.60%***	**0.56%*****	0.00%	0.16%***	0.78%***	**0.78%*****
1	-0.23%***	0.04%	0.21%***	**0.44%*****	-0.12%***	0.05%**	0.25%***	**0.37%*****	0.13%**	-0.01%	0.09%*	**-0.04%**
(2, 10)	-0.11%*	0.32%***	0.59%***	**0.71%*****	0.22%***	0.26%***	0.94%***	**0.72%*****	0.63%***	0.43%***	0.73%***	**0.10%**
(0, 2)	-0.26%***	0.21%***	0.71%***	**0.97%*****	-0.08%*	0.22%***	1.04%***	**1.13%*****	0.22%**	0.14%***	0.97%***	**0.74%*****

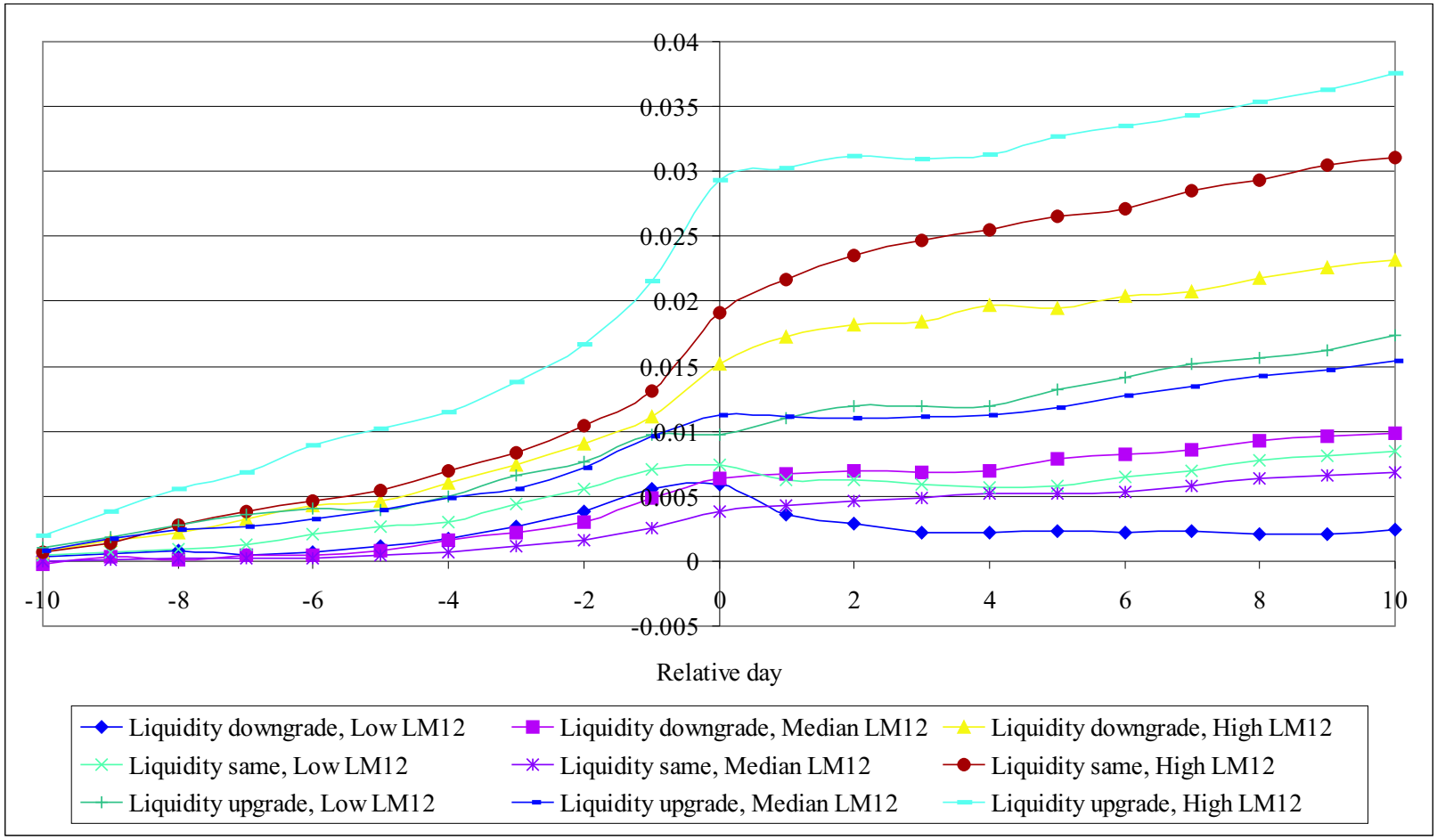

Figure 9: Cumulative Abnormal Return during Quarterly Earnings Announcement Period: Control for Changes of Liquidity

This figure shows the cumulative abnormal return during quarterly earnings announcement periods. Sample includes quarterly announcements of firms listed on NYSE/AMEX/NASDAQ from 1982 to 2004. The abnormal return is calculated from Fama and French 3-factor model. The cumulative abnormal return is the sum of abnormal return since day -10. Up (Down) indicates that the liquidity of stocks increase (decrease) from June year $t-1$ to June year t.

low-LM12 stocks. To rule out the possibility that our results are attributed to changes in risk caused by earnings announcements, in this subsection, we control for changes in risk in our analysis. We run Fama and French 3-factor model for both period (-40, -11) and period (11, 40), compare the factor loadings between these two periods, and divide our sample into three groups: decrease in risk, little change in risk, and increase in risk. Since we cannot know whether changes in risk are driven by information from earnings announcements or not, the changes in risk may not be associated with the differences of announcement returns. The results are shown in Table 7 and the graphical summaries are presented in Figure 10, Figure 11, and Figure 12. After controlling for changes in risk, the abnormal returns for high-LM12 stocks are still significant higher than that of low-LM12 stocks during the period (0, 2). However, the abnormal returns of announcements with a decrease in risk are not necessarily higher than the returns of announcements with an increase in risk. Our results do not show that returns of earnings announcements reflect changes in future risk. We conjecture that on average the changes in risk are not large enough to affect announcement returns. Thus, announcements with a future increase (decrease) in risk may have certain characteristics which lead to high (low) announcement returns.

5.2.6 Use Market-Adjusted Return, Use Only NYSE/AMEX Stocks, and Use Only Announcements with Trade on Day -2

In this subsection, we do three robustness checks. First, in previous analysis, we calculate the abnormal return from Fama-French 3-factor model.To rule out the possibility that our results are driven by this specific asset pricing model, we calculate the market-adjusted returns (raw stock return minus value-weighted index of NYSE, AMEX, and

Table 7: Robustness Check for Earnings Announcement Effect on Stock Return: Control for Change of Risk

This table shows the abnormal returns during earnings announcement periods. The abnormal return is calculated based on Fama and French 3-factor model. During the estimation period before announcement (day -11 to day -40), the beta, loadings of SMB, and loadings of HML are estimated from Fama and French 3-factor model. After the announcement, the beta, loadings of SMB, and loadings of HML are estimated again during the period between day 11 and day 40. 9 groups are formed based on LM12 and changes of factor loading. The T-statistics are used to test the null hypothesis that the number is not different from zero. ***, **, and * indicate that a number is significant different from zero at 1%, 5%, and 10%, respectively, from a two-tailed T test

	Decrease in Risk				Little Change in Risk				Increase in Risk			
	Low LM12	Median	High LM12	High −Low	Low LM12	Median	High LM12	High −Low	Low LM12	Median	High LM12	High −Low
β_{MKTRF}												
# OBS	35167	29919	19607		34248	35353	17691		35010	29880	19796	
(-10, -2)	0.15%**	0.11%	0.87%***	**0.72%*****	0.40%***	0.24%***	0.74%***	**0.34%*****	1.04%***	0.88%***	2.02%***	**0.97%*****
-1	0.17%***	0.20%***	0.28%***	**0.11%****	0.14%***	0.12%***	0.23%***	**0.09%****	0.23%***	0.20%***	0.40%***	**0.18%*****
0	-0.09%**	0.07%**	0.63%***	**0.72%*****	0.12%***	0.16%***	0.45%***	**0.33%*****	0.02%	0.22%***	0.62%***	**0.60%*****
1	-0.31%***	-0.05%	0.02%	**0.33%*****	-0.04%	0.07%***	0.27%***	**0.31%*****	-0.10%***	0.02%	0.27%***	**0.37%*****
(2, 10)	-0.43%***	-0.14%**	0.34%***	**0.77%*****	0.25%***	0.32%***	0.59%***	**0.34%*****	0.67%***	0.89%***	1.59%***	**0.92%*****
(0, 2)	-0.46%***	-0.02%	0.75%***	**1.21%*****	0.09%**	0.29%***	0.81%***	**0.72%*****	-0.07%	0.29%***	1.12%***	**1.19%*****
β_{SMB}												
# OBS	34910	29806	20051		34730	35558	17048		34810	29823	20122	
(-10, -2)	0.21%***	0.17%**	0.85%***	**0.64%*****	0.44%***	0.23%***	0.77%***	**0.34%*****	0.95%***	0.84%***	1.98%***	**1.04%*****
-1	0.18%***	0.23%***	0.32%***	**0.14%*****	0.18%***	0.11%***	0.22%***	**0.04%**	0.18%***	0.19%***	0.37%***	**0.19%*****
0	-0.03%	0.14%***	0.58%***	**0.61%*****	0.12%***	0.15%***	0.57%***	**0.45%*****	-0.04%	0.17%***	0.56%***	**0.60%*****
1	-0.25%***	-0.06%*	0.11%**	**0.35%*****	-0.01%	0.07%***	0.17%***	**0.18%*****	-0.20%***	0.02%	0.27%***	**0.47%*****
(2, 10)	-0.14%**	0.06%	0.66%***	**0.80%*****	0.22%***	0.41%***	0.67%***	**0.45%*****	0.40%***	0.57%***	1.20%***	**0.80%*****
(0, 2)	-0.31%***	0.08%	0.78%***	**1.10%*****	0.14%***	0.26%***	0.86%***	**0.72%*****	-0.28%***	0.22%***	1.03%***	**1.31%*****
β_{HML}												
# OBS	34913	29852	20004		34330	35802	17205		35207	29533	20012	
(-10, -2)	0.15%**	0.20%***	0.92%***	**0.77%*****	0.42%***	0.17%***	0.79%***	**0.37%*****	1.01%***	0.88%***	1.91%***	**0.90%*****
-1	0.18%***	0.22%***	0.31%***	**0.13%****	0.11%***	0.11%***	0.20%***	**0.08%****	0.24%***	0.19%***	0.40%***	**0.16%*****
0	-0.05%	0.10%***	0.65%***	**0.70%*****	0.14%***	0.19%***	0.41%***	**0.27%*****	-0.03%	0.16%***	0.63%***	**0.66%*****
1	-0.28%***	-0.02%	0.09%*	**0.37%*****	0.01%	0.05%**	0.18%***	**0.17%*****	-0.19%***	0.01%	0.28%***	**0.47%*****
(2, 10)	-0.43%***	-0.10%	0.43%***	**0.86%*****	0.29%***	0.30%***	0.53%***	**0.25%*****	0.62%***	0.87%***	1.54%***	**0.92%*****
(0, 2)	-0.41%***	0.04%	0.83%***	**1.25%*****	0.17%***	0.26%***	0.68%***	**0.51%*****	-0.20%***	0.26%***	1.14%***	**1.34%*****

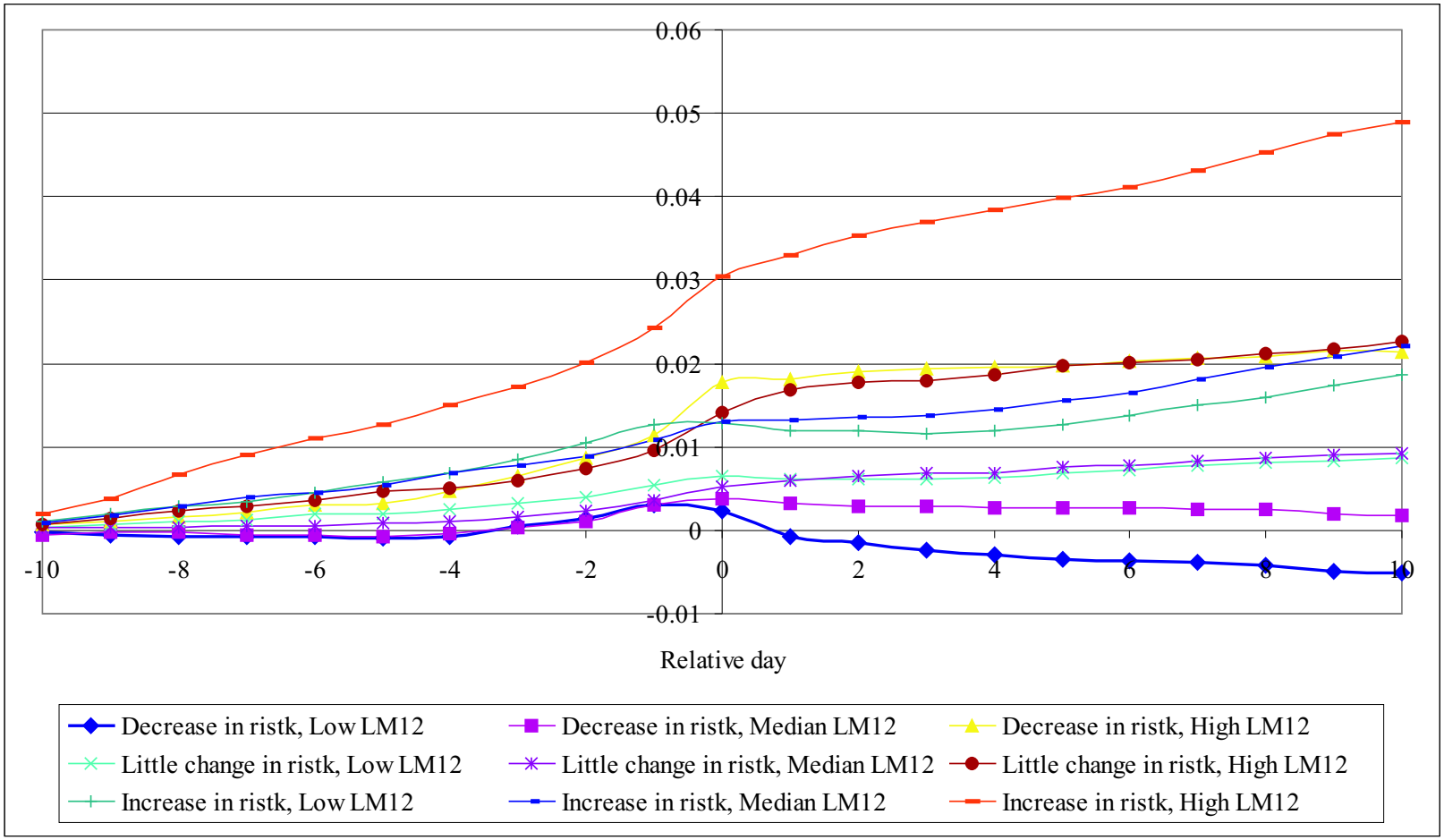

Figure 10: Cumulative Abnormal Return during Quarterly Earnings Announcement Period: Control for Changes of $\beta_{\mathbf{MKTRF}}$

This figure shows the cumulative abnormal return during quarterly earnings announcement periods after controlling for changes of β_{MKTRF}. Sample includes quarterly announcements of firms listed on NYSE/AMEX/NASDAQ from 1982 to 2004. The abnormal return is calculated from Fama and French 3-factor model. The cumulative abnormal return is the sum of abnormal return since day −10. The changes of beta is defined as the difference between the beta during (−40, −11) and during (11, 40).

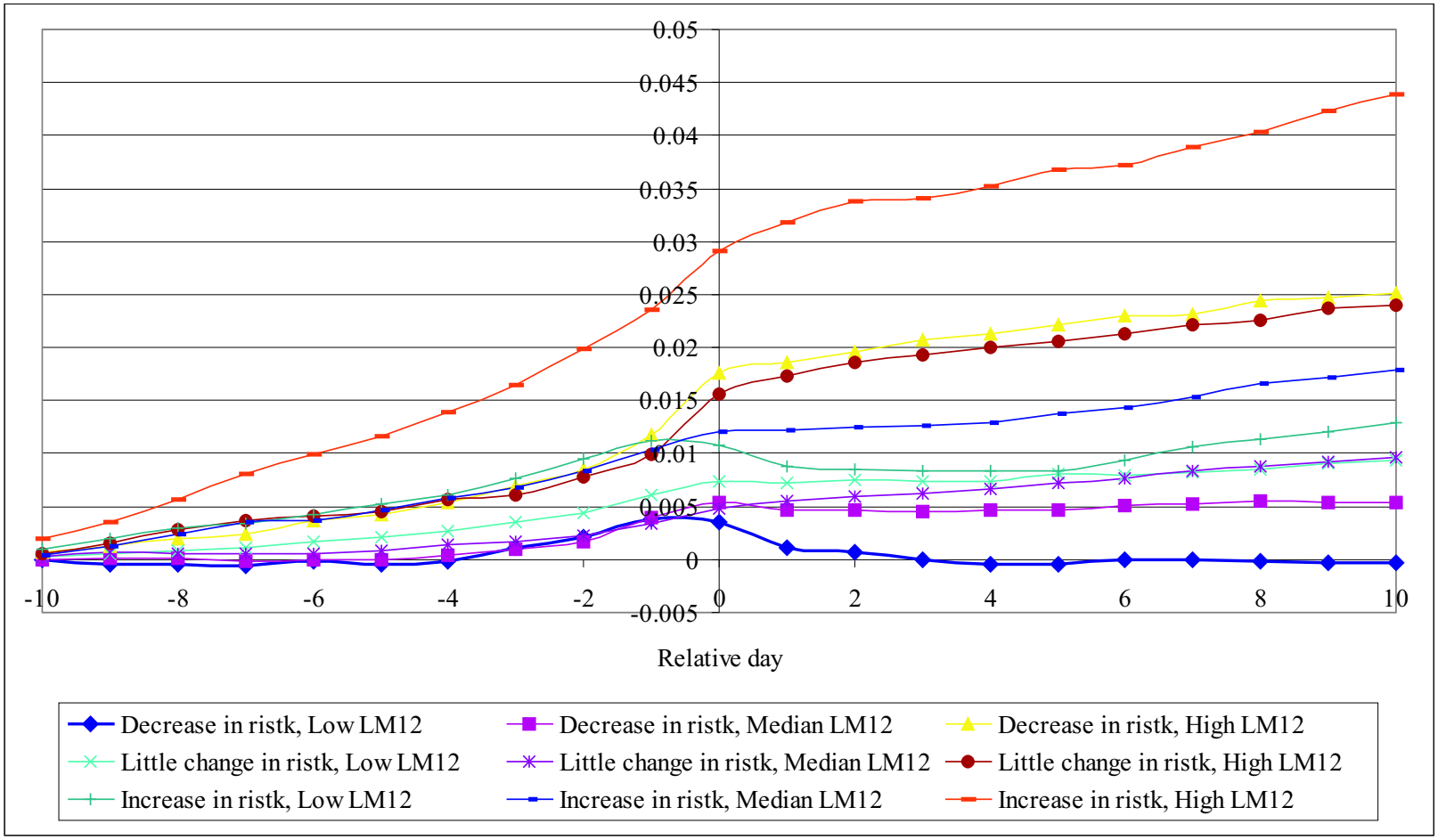

Figure 11: Cumulative Abnormal Return during Quarterly Earnings Announcement Period: Control for Changes of β_{SMB}

This figure shows the cumulative abnormal return during quarterly earnings announcement periods after controlling for changes of β_{SMB}. Sample includes quarterly announcements of firms listed on NYSE/AMEX/NASDAQ from 1982 to 2004. The abnormal return is calculated from Fama and French 3-factor model. The cumulative abnormal return is the sum of abnormal return since day -10. The changes of beta is defined as the difference between the beta during $(-40, -11)$ and during $(11, 40)$.

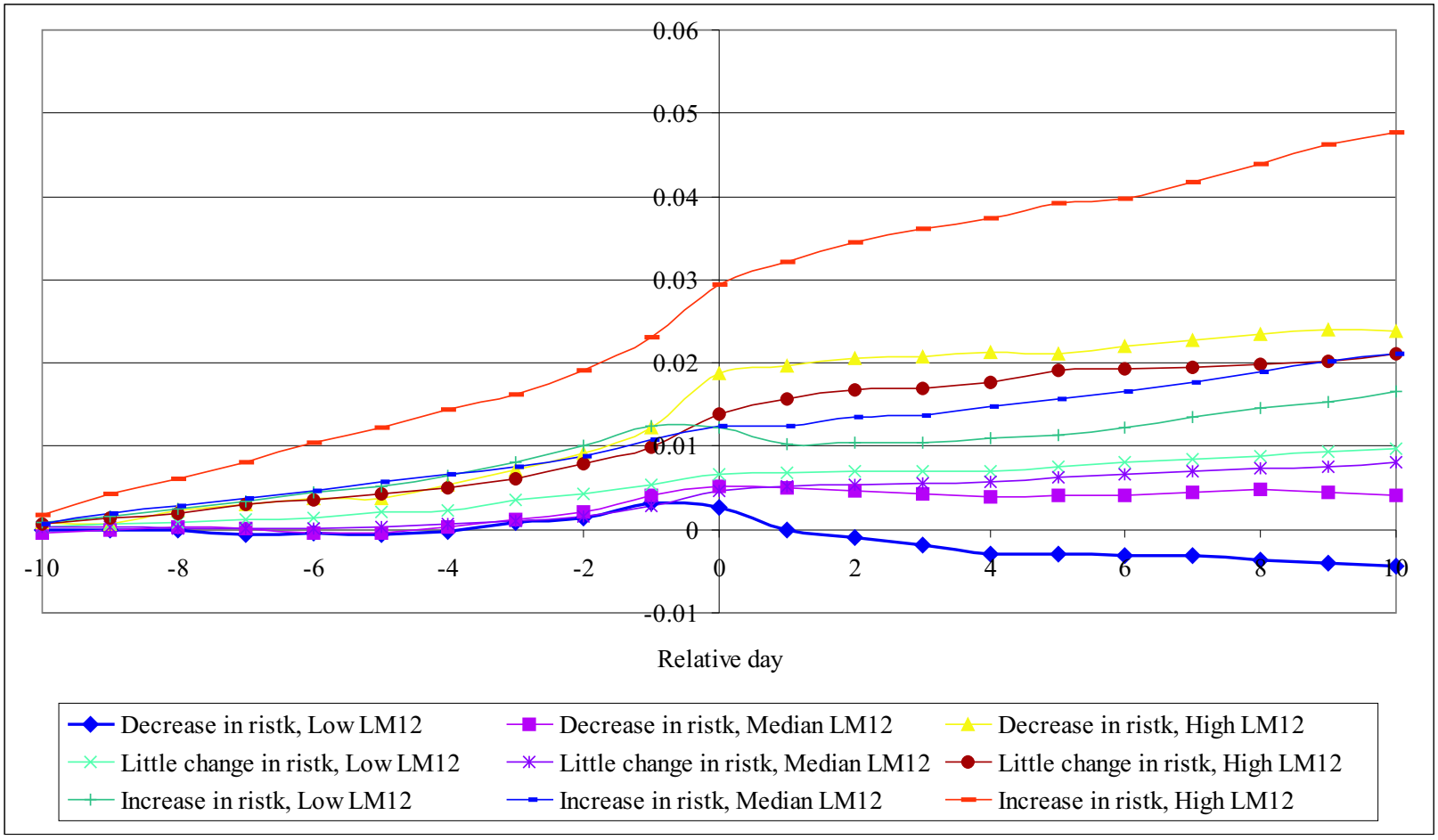

Figure 12: Cumulative Abnormal Return during Quarterly Earnings Announcement Period: Control for Changes of $\beta_{\mathbf{HML}}$

This figure shows the cumulative abnormal return during quarterly earnings announcement periods after controlling for changes of β_{HML}. Sample includes quarterly announcements of firms listed on NYSE/AMEX/NASDAQ from 1982 to 2004. The abnormal return is calculated from Fama and French 3-factor model. The cumulative abnormal return is the sum of abnormal return since day -10. The changes of beta is defined as the difference between the beta during $(-40, -11)$ and during $(11, 40)$.

NASDAQ stocks) and redo our analysis. Second, compared with NYSE/AMEX trading activities, NASDAQ volume is double counted and inflated by interdealer trades (See Atkins and Dyl (1997)). To examine whether our results are affected by different market microstructures between NASDAQ and NYSE/AMEX, we delete NASDAQ stocks and test the first hypothesis again. Third, the prices of high-LM12 stocks are usually stale because the trading of these stocks is not active. Thus the high returns of high-LM12 stocks may result from the information content of quarterly earnings announcements as well as other events which occur before the announcements. To rule out the possibility that our results come from the stale prices of high-LM12 stocks, we delete announcements which do not have trade on day -2 and examine whether our hypothesis still hold for stocks without stale prices.

The results of the three robustness checks are shown in panel A, panel B, and panel C of Table 8. Their graphical summaries are provided in Figure 13, Figure 14, and Figure 15. For all three tests, we find similar results. In general, the abnormal returns right after earnings announcements increase with LM12. The differences of abnormal returns between low-LM12 and high-LM12 stocks are all significant at 1% level during the period (0, 2). The lowest LM12 decile tends to have speculative trading before announcements. Comparing each of the three tests with the results in Table 2, we find that the differences between high-LM12 and low-LM12 groups are slightly smaller when we use market-adjusted returns as the abnormal returns. When we include only NYSE/AMEX stocks in the sample, the abnormal return during (0, 2) is about half of the abnormal return when we include all NYSE/AMEX/NASDAQ stocks. Because NASDAQ stocks are usually smaller, riskier, and

Table 8: Robustness Check for Earnings Announcement Effect on Stock Return: Use Market-Adjusted Return, Include Only NYSE/AMEX Stocks, and Include Only Announcements with Trade on Day −2

This table shows the abnormal returns during earnings announcement periods. The abnormal return is calculated based on Fama and French 3-factor model. Panel A reports the results when market-adjusted returns is used to calculate abnormal returns. The market-adjusted return is defined as the difference between individual stock return minus the market return (value-weighted return from all NYSE/AMEX/NASDAQ stocks). Panel B reports the results for only NYSE/AMEX stocks. Panel C reports the results for announcements with trades on day −2. In all panels, T-statistics are used to test the null hypothesis that the number is not different from zero. ***, **, and * indicate that a number is significant different from zero at 1%, 5%, and 10%, respectively, from a two-tailed T test.

Panel A: Use market-adjusted return as the abnormal return

	1 Low LM12 (Liquid)	2	3	4	5	6	7	8	9	10 High LM12 (Illiquid)	10−1
# OBS	31663	32028	32126	31909	29938	26748	24133	21423	18325	11816	
(-10, -2)	1.04%***	0.55%***	0.35%***	0.34%***	0.20%***	0.43%***	0.85%***	1.02%***	1.23%***	1.02%***	**-0.02%**
-1	0.25%***	0.18%***	0.13%***	0.11%***	0.12%***	0.17%***	0.27%***	0.29%***	0.25%***	0.32%***	**0.07%***
0	-0.05%	0.00%	0.07%**	0.09%***	0.12%***	0.12%***	0.31%***	0.36%***	0.65%***	0.79%***	**0.84%*****
1	-0.35%***	-0.11%***	-0.06%**	0.05%*	0.01%	0.02%	-0.02%	0.10%**	0.24%***	0.28%***	**0.63%*****
(2, 10)	0.13%*	0.26%***	0.31%***	0.37%***	0.50%***	0.40%***	0.33%***	0.54%***	0.65%***	1.08%***	**0.96%*****
(0, 2)	-0.45%***	-0.10%*	0.03%	0.19%***	0.17%***	0.16%***	0.32%***	0.53%***	1.04%***	1.33%***	**1.79%*****

Panel B: Effects of only NYSE/AMEX stocks

	1 Low LM12 (Liquid)	2	3	4	5	6	7	8	9	10 High LM12 (Illiquid)	10−1
# OBS	13167	13299	13518	13055	13031	12384	11268	10982	9231	6365	
(-10, -2)	0.21%**	0.12%	-0.06%	0.02%	-0.09%	-0.06%	0.05%	0.22%	0.74%	0.79%	**0.57%*****
-1	0.18%***	0.11%***	0.04%*	0.01%	0.01%	0.09%***	0.06%*	0.15%***	0.17%***	0.27%***	**0.09%**
0	0.04%	0.18%***	0.08%**	0.12%***	0.12%***	0.09%**	0.10%**	0.19%***	0.26%***	0.68%***	**0.65%*****
1	-0.17%***	0.07%*	0.05%	0.04%	0.03%	0.02%	-0.02%	0.03%	-0.06%	0.09%	**0.26%*****
(2, 10)	-0.10%	0.19%***	0.33%***	0.18%***	0.29%***	0.22%***	0.27%***	-0.07%	0.22%*	0.59%***	**0.69%*****
(0, 2)	-0.11%	0.27%***	0.14%**	0.19%***	0.21%***	0.16%***	0.14%**	0.14%**	0.20%**	0.85%***	**0.96%*****

Table 8 continued

Panel C: Effects for only announcements with trading on day −2

	1 Low LM12 (Liquid)	2	3	4	5	6	7	8	9	10 High LM12 (Illiquid)	10−1
# OBS	31653	32006	32099	31846	29720	26216	23020	19254	14910	6909	
(-10, -2)	1.00%***	0.48%***	0.28%***	0.29%***	0.20%***	0.42%***	0.88%***	1.20%***	1.57%***	1.14%***	**0.14%**
-1	0.27%***	0.17%***	0.12%***	0.12%***	0.13%***	0.20%***	0.37%***	0.43%***	0.43%***	0.85%***	**0.58%*****
0	-0.05%	0.00%	0.06%**	0.08%***	0.14%***	0.14%***	0.32%***	0.37%***	0.70%***	1.01%***	**1.06%*****
1	-0.39%***	-0.10%***	-0.08%**	0.04%	0.01%	0.01%	-0.02%	0.08%*	0.23%***	0.26%***	**0.65%*****
(2, 10)	0.04%	0.16%***	0.18%***	0.29%***	0.44%***	0.35%***	0.33%***	0.76%***	0.92%***	1.33%***	**1.29%*****
(0, 2)	-0.49%***	-0.11%*	-0.01%	0.15%***	0.20%***	0.17%***	0.30%***	0.55%***	1.09%***	1.53%***	**2.02%*****

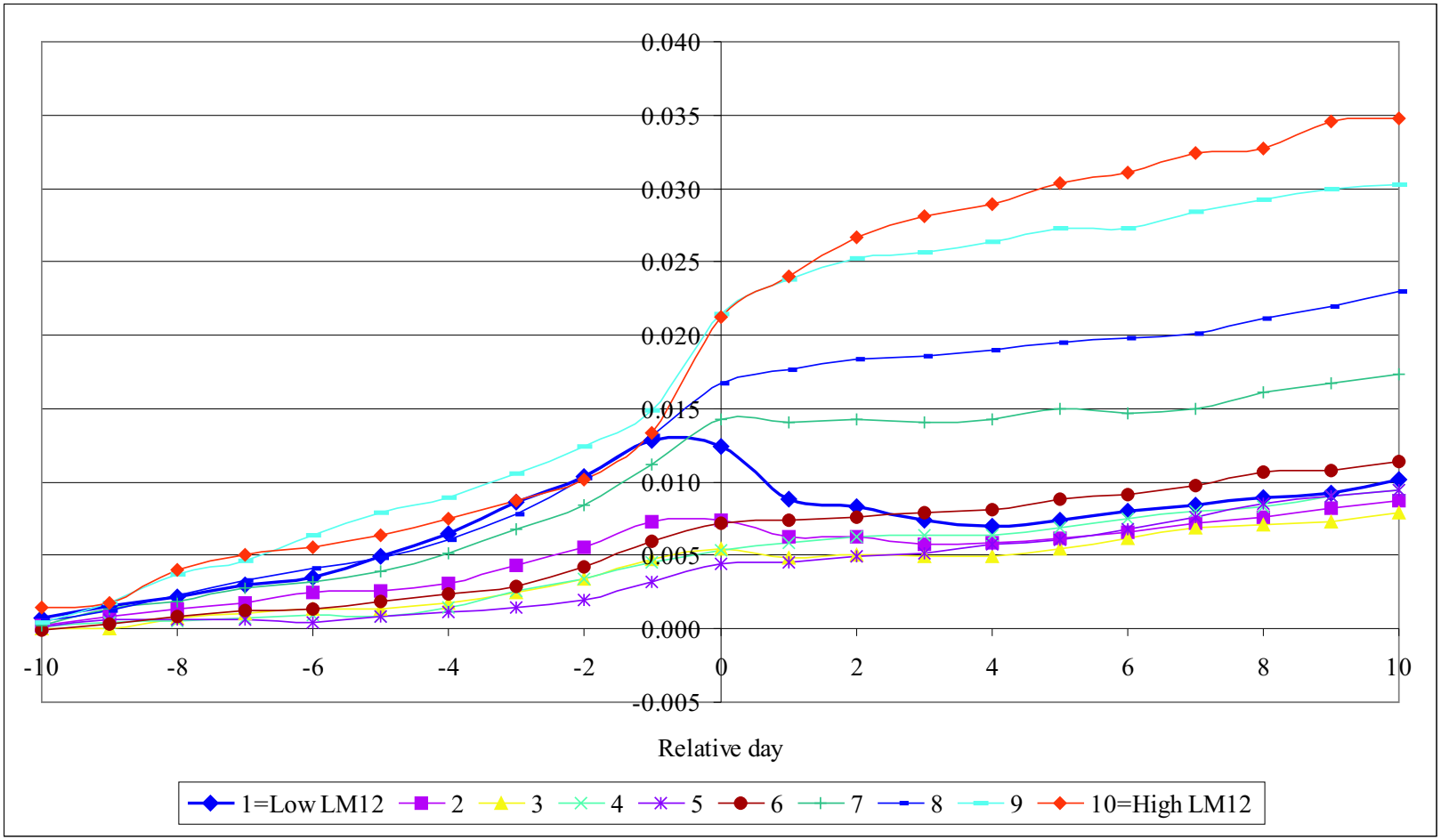

Figure 13: Cumulative Abnormal Return during Quarterly Earnings Announcement Period: Use Market-Adjusted Return as Abnormal Return

This figure shows the cumulative market-adjusted return during quarterly earnings announcement periods. Sample includes quarterly announcements of firms listed on NYSE/AMEX/NASDAQ from 1982 to 2004. The abnormal return (market-adjusted return) is defined as the difference between individual stock return and valued-weighted market return from all NYSE/AMEX/NASDAQ stocks. The cumulative abnormal return is the sum of abnormal return since day −10.

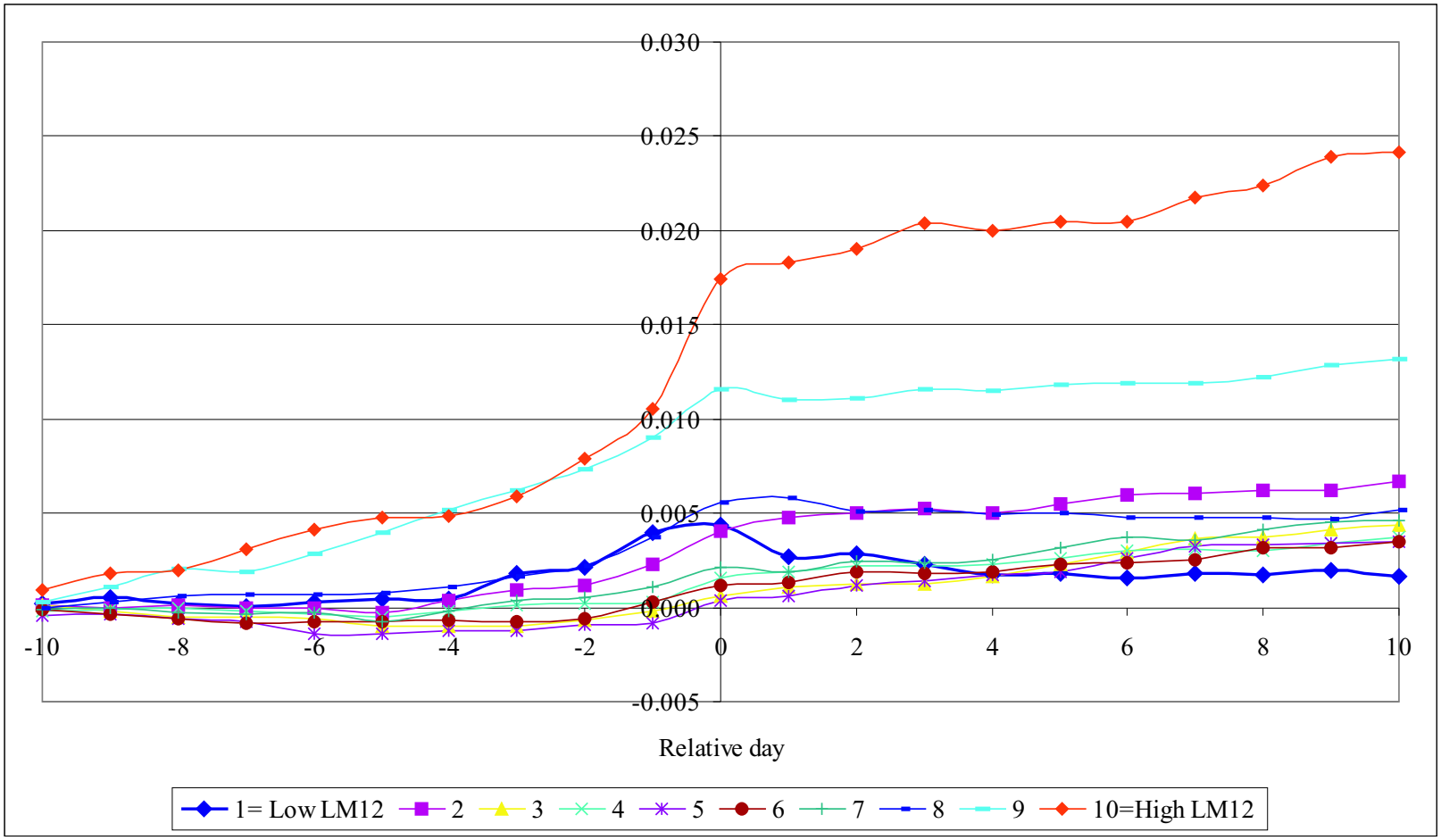

Figure 14: Cumulative Abnormal Return during Quarterly Earnings Announcement Period for NYSE/AMEX Stocks

This figure shows the cumulative abnormal return during quarterly earnings announcement periods for only NYSE and AMEX stocks. Sample includes quarterly announcements of firms listed on NYSE and AMEX from 1982 to 2004. The abnormal return is calculated from Fama and French 3-factor model. The cumulative abnormal return is the sum of abnormal return since day -10.

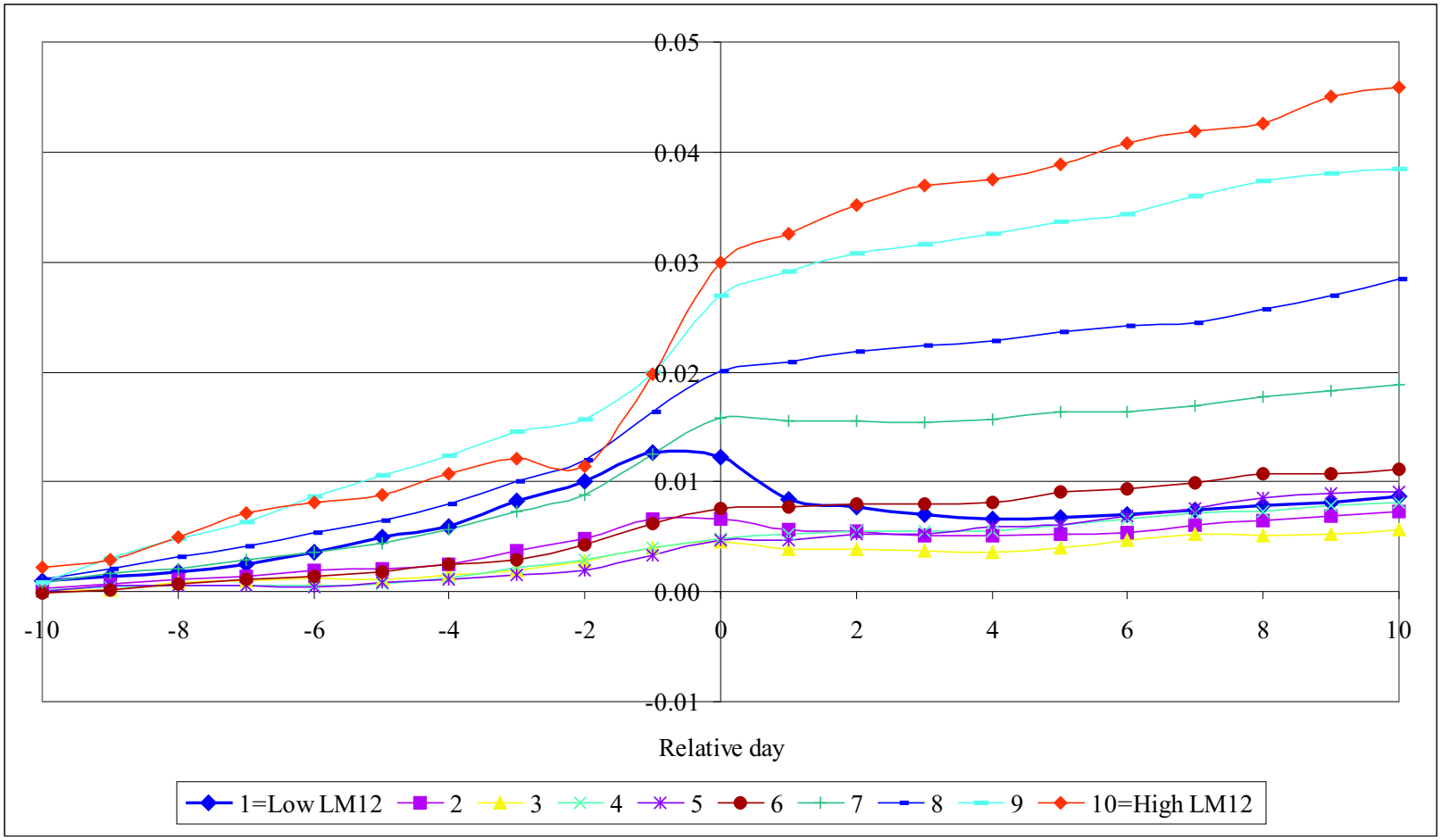

Figure 15: Cumulative Abnormal Return during Quarterly Earnings Announcement Period: Use Only Announcements with Trade on Day −2

This figure shows the cumulative abnormal return around quarterly earnings announcement with trade on day -2. Sample includes quarterly announcements with trade on day -2 for firms listed on NYSE/AMEX/NASDAQ from 1982 to 2004. The abnormal return is calculated from Fama and French 3-factor model. The cumulative abnormal return is the sum of abnormal return since day −10.

younger, which makes their valuation difficult, they are more attractive to speculative investors than NYSE/AMEX stocks. As a result, the effect of speculative trading on the announcement returns should be the highest for NASDAQ stocks. Excluding NASDAQ stocks should lead to a less strong effect. In panel C, we find that in the lowest LM12 decile, about 99.97% announcements have trade on day -2. For the highest-LM12 stocks, only about 58.47% announcements have non-zero trading volume on day -2. After excluding announcements without trade on day -2, we still find a similar magnitude of abnormal returns. Together, the three robustness checks in this subsection show that our results are not driven by a specific asset pricing model, by stocks listed on a particular exchange, and by inactive firms with stale prices prior to the quarterly earnings announcements.

5.2.7 Subperiod Analysis

In this study, we argue that liquid stocks are more likely to be overvalued due to speculative trading and the overpricing may be partially corrected after quarterly earnings announcements. Our analysis requires investors correct their mispricing right after quarterly earnings announcements. We focus on the revision for each stock, rather than the crash of a bubble for the whole market. However, the market-wide sentiment can also affect investors' revision for each stock. During the bubble period when investors' sentiment is high, possibly investors would still be too optimistic even though they learn the stock price is not justified by the firm's fundamental value. Abreu and Brunnermeier (2003) argue that although arbitrageurs know the existence of a bubble, if it will not burst soon, instead of selling the bubble stock, they would like to ride the bubble for a while. As a result, during the bubble period, possibly the revision of mispricing is not as strong as the revision during

the non-bubble period. In this subsection , we examine whether investors' reactions during the bubble period are different from those during the non-bubble period.

Following Ofek and Richardson (2003), we define the bubble period as the period from Jan. 1998 to Feb. 2000. In panel A of Table 9 and Figure 16, we report the results during the bubble period. The results during the non-bubble period are shown in panel B of Table 9 and Figure 17. During both bubble and non-bubble periods, the differences of cumulative abnormal returns between high-LM12 and low-LM12 stocks from day 0 to day 2 are significant at 1% level. Comparing the results during the bubble period with those during the non-bubble period, we find that the difference is lower for the bubble period than for the non-bubble period. Furthermore, for the lowest four LM12 decile, the cumulative abnormal return from day -10 to day -2 during the bubble period is much higher than that during non-bubble period, especially for the lowest LM12 decile. We conjecture that during the bubble period when investors' sentiment is high, many investors speculate in the upcoming earnings announcements of low-LM12 stocks, which drives the stock prices up significantly. After the announcements, because investors still have high sentiment during the bubble period, the adjustment of mispricing is not as high as the revision during the non-bubble period.

5.2.8 Summary of Robustness Checks

In this section, we provide various robustness checks to test whether the abnormal returns of high-LM12 firms are higher than the abnormal returns of low-LM12 firms after earnings announcements. Our results hold well after we control for book-to-market, revisions of growth forecasts, analyst forecast dispersions, changes of return volatility,

Table 9: Robustness Check for Earnings Announcement Effect on Stock Return: Sub-period Analysis

This table shows the abnormal returns during earnings announcement periods for ten LM12 groups. The abnormal return is calculated based on Fama and French 3-factor model. Panel A reports the results during Internet bubble period from Jan. 1998 to Feb. 2000. Panel B shows the results for announcements which are not made during the bubble period. In both panels, the T-statistics are used to test the null hypothesis that the number is not different from zero. ***, **, and * indicate that a number is significant different from zero at 1%, 5%, and 10%, respectively, from a two-tailed T test

Panel A: Effects for announcements during the period from Jan. 1998 to Feb. 2000 (Internet bubble period)

	1 Low LM12 (Liquid)	2	3	4	5	6	7	8	9	10 High LM12 (Illiquid)	10−1
# OBS	4465	4404	4467	4635	4661	4089	3888	3453	3139	2115	
(-10, -2)	2.25%***	1.08%***	0.98%***	0.99%***	-0.02%	0.24%	1.22%***	1.36%***	1.57%***	0.03%	**-2.22%*****
-1	0.76%***	0.59%***	0.36%***	0.19%***	0.19%***	0.42%***	0.31%***	0.44%***	0.14%	0.57%***	**-0.19%**
0	0.12%	0.02%	0.21%**	0.12%	0.19%***	0.25%***	0.51%***	0.56%***	0.72%***	0.79%***	**0.66%*****
1	-0.39%***	-0.09%	-0.25%**	0.14%*	0.07%	-0.02%	0.10%	-0.07%	0.09%	0.09%	**0.48%****
(2, 10)	0.16%	0.44%**	0.14%	0.09%	0.21%	0.18%	0.25%	0.72%***	0.75%***	1.01%***	**0.85%****
(0, 2)	-0.44%**	0.00%	-0.05%	0.27%**	0.24%**	0.17%	0.68%***	0.65%***	1.06%***	1.19%***	**1.63%*****

Panel B: Effects for announcements which are not made during the period from Jan. 1998 to Feb. 2000 (Non-bubble period)

	1 Low LM12 (Liquid)	2	3	4	5	6	7	8	9	10 High LM12 (Illiquid)	10−1
# OBS	27198	27624	27659	27274	25277	22659	20245	17970	15186	9701	
(-10, -2)	0.79%***	0.39%***	0.16%***	0.17%***	0.25%***	0.46%***	0.85%***	1.10%***	1.46%***	1.40%***	**0.60%*****
-1	0.19%***	0.11%***	0.08%***	0.10%***	0.11%***	0.13%***	0.31%***	0.29%***	0.26%***	0.33%***	**0.15%****
0	-0.08%*	0.00%	0.04%	0.07%**	0.13%***	0.11%***	0.29%***	0.33%***	0.66%***	0.84%***	**0.91%*****
1	-0.38%***	-0.10%***	-0.05%	0.02%	-0.01%	0.01%	-0.03%	0.13%***	0.29%***	0.35%***	**0.73%*****
(2, 10)	0.02%	0.12%**	0.20%***	0.32%***	0.49%***	0.40%***	0.40%***	0.75%***	0.94%***	1.39%***	**1.37%*****
(0, 2)	-0.50%***	-0.13%**	0.00%	0.13%***	0.19%***	0.16%***	0.26%***	0.55%***	1.11%***	1.48%***	**1.98%*****

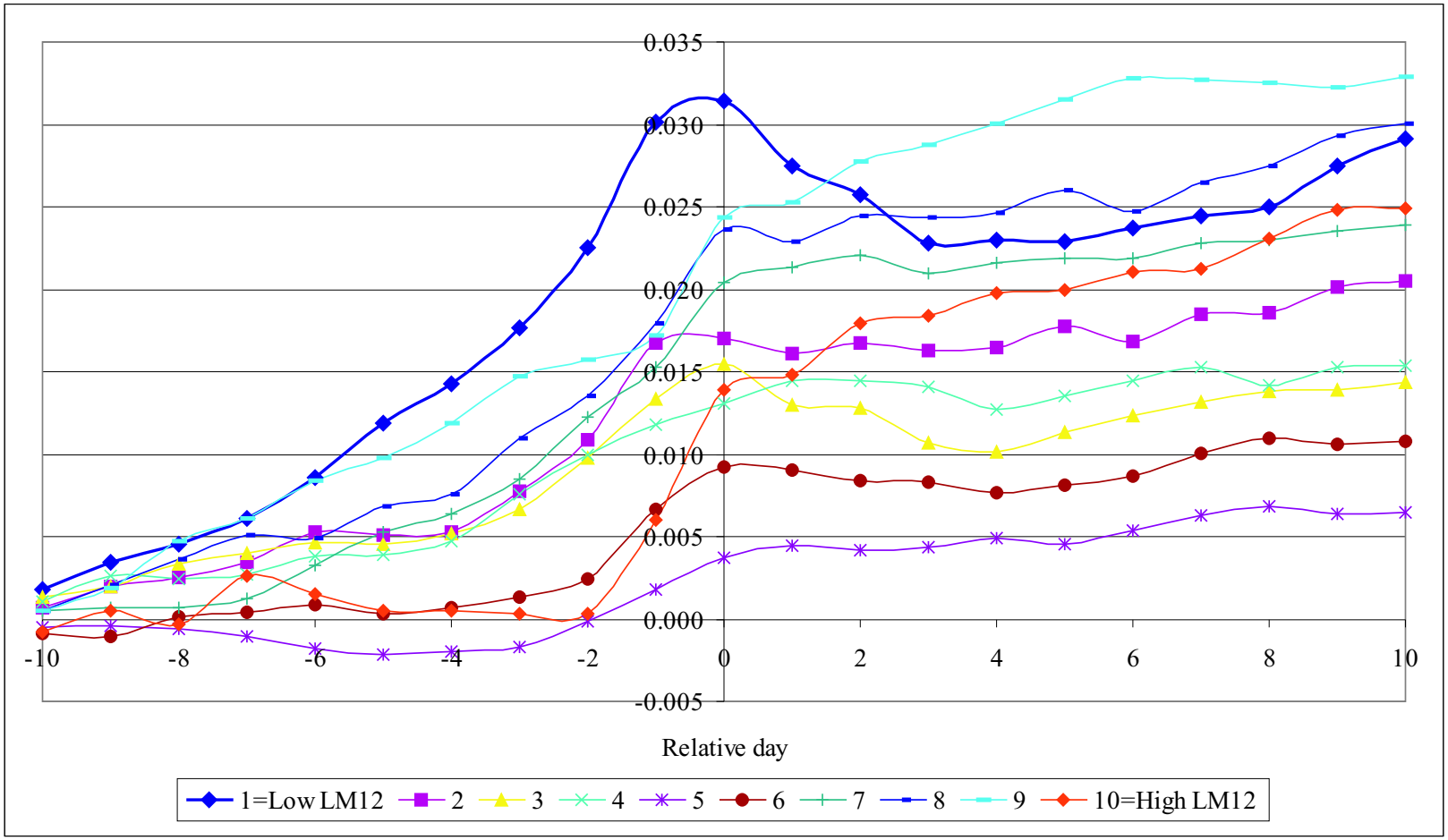

Figure 16: Cumulative Abnormal Return around Quarterly Earnings Announcement during Internet Bubble Period

This figure shows the cumulative abnormal return around quarterly earnings announcements during the period from Jan.1998 to Feb 2000. The abnormal return is calculated from Fama and French 3-factor model. The cumulative abnormal return is the sum of abnormal return since day −10.

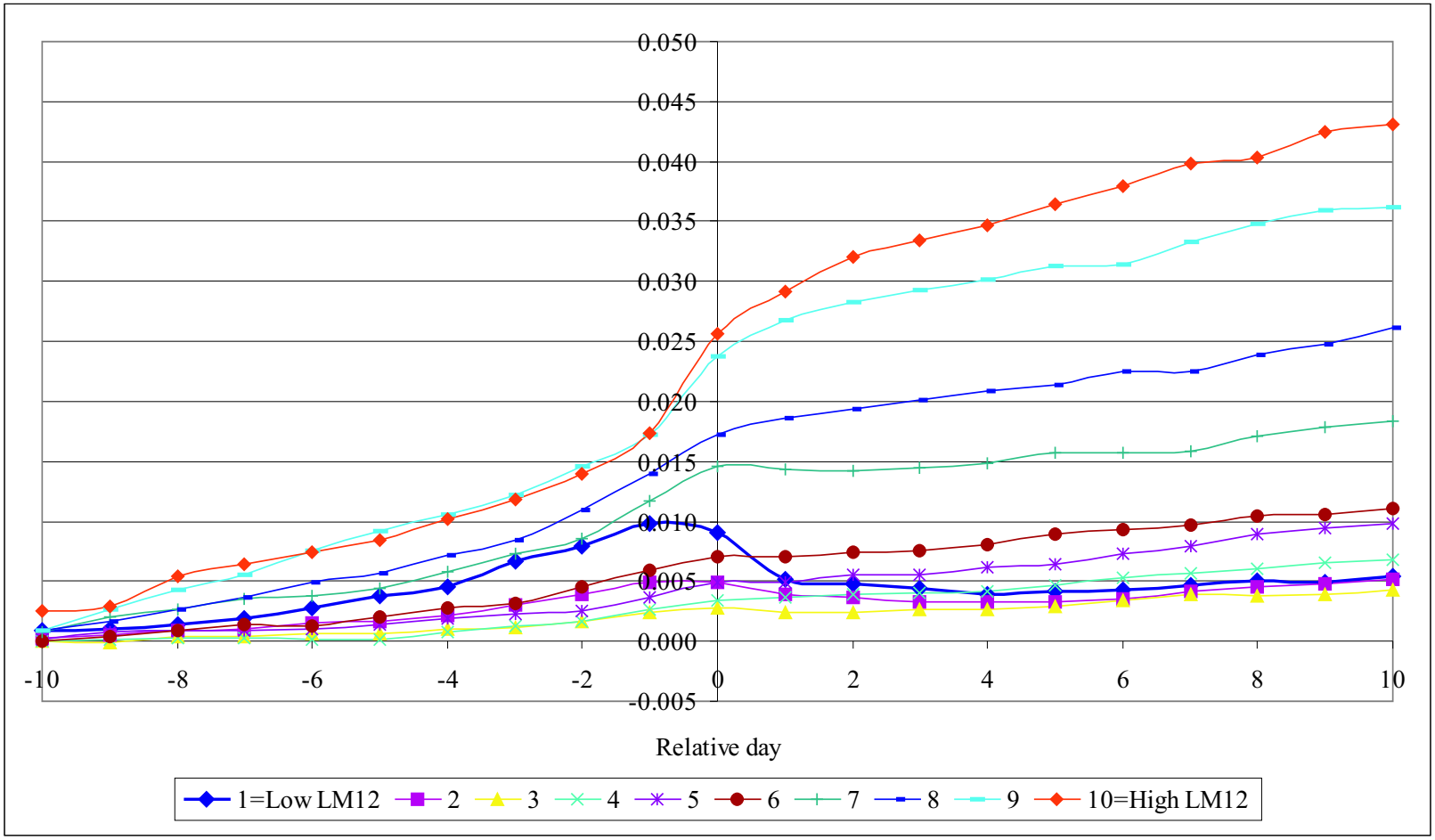

Figure 17: Cumulative Abnormal Return around Quarterly Earnings Announcement during Non-Bubble Period

This figure shows the cumulative abnormal return around quarterly earnings announcement. Sample includes quarterly announcements of firms listed on NYSE/AMEX/NASDAQ from 1982 to 2004, excluding the period from Jan.1998 to Feb 2000. The abnormal return is calculated from Fama and French 3-factor model. The cumulative abnormal return is the sum of abnormal return since day −10.

changes of future liquidity, and for changes in risk. Tests which use market-adjusted return as the abnormal returns, tests for only NYSE/AMEX stocks, and tests for announcements with trade on day -2 indicate that our results are not driven by a specific asset pricing model, by different market microstructures, and by stale prices of high-LM12 stocks. When we control for size, high-LM12 firms still earn higher announcement returns than low-LM12 firms in small-size and median-size groups. However, for large firms, the difference is not significant. A possible reason is that large firms are less likely to be affected by investors' speculative demand than small firms. When we control for the number of analysts following, we find a similar pattern as size-control groups. Our hypothesis hold for both low-following and median-following stocks. For announcements with high analysts following, our result is not significant. This result may be attributed to small sample size or firm-specific problems for high-following high-LM12 stocks.

Examining the forecast errors of the announcements in different LM12 groups, we find that analysts are more optimistic for low-LM12 stocks. However, the magnitude of the optimism is not significant. Therefore, although our results may be partially driven by analysts' rosy forecasts for low-LM12 stocks, we do not think the significant large differences of abnormal returns between high-LM12 and low-LM12 groups are solely caused by analysts' biased forecasts. When we divide our sample into the bubble and non-bubble period, we find many investors speculate in low-LM12 stocks before quarterly announcements during the bubble period. After the announcements, because investors still have high sentiment during this period, the adjustment of mispricing is not as high as the revision during the non-bubble period.

Investigating the path of cumulative abnormal returns during the period from day -10 to day 10, we find investors of low-LM12 stocks tend to be too optimistic before the announcements. The cumulative abnormal returns of low-LM12 stocks increase significantly prior to the announcements. After the announcements, however, the cumulative abnormal returns drop significantly. This result suggests that for low-LM12 stocks, speculative trading occurs before earnings announcements. Because high-LM12 stocks do not show this pattern, our results indicate that liquid stocks are more likely to be affected by speculative trading and to be overpriced, which supports Scheinkman and Xiong (2003). Among all low-LM12 stocks, the pattern holds particularly for small, growth, high-dispersion, low-following stocks, which are also consistent with Baker and Wurgler's (2006) argument that stocks with more subjective valuation are most likely to be affected by speculative demand.

5.3 Abnormal Volume around Earnings Announcements

In this section, we test the hypothesis that before the quarterly earnings announcements when the valuation of a stock among investors are dispersed, low-LM12 stocks are more likely to incur speculative trading and thus the decrease, if any, in trading volume of low-LM12 stocks is less severe than that of high-LM12 stocks. Following Chae (2005), we define the abnormal volume as the log turnover minus the average log turnover during the estimation period. The results are shown in Table 10 and Figure 18. Consistent with Chae (2005), our results show that except the lowest LM12 decile, from day -10 to day -2 the trading volume decreases significantly. This result indicates that cautious liquidity traders do withdraw their trades before earnings announcements. Investigating the abnormal volume among the ten LM12 groups, we find the decrease in volume before the

Table 10: Quarterly Earnings Announcement Effect on Trading Volume

This table shows the abnormal volume during quarterly earnings announcement periods. Sample includes 260,109 quarterly announcements of firms listed on NYSE/AMEX/NASDAQ from 1982 to 2004. The abnormal volume is calculated as the difference of log turnover on an event day and the average log turnover during the estimation period. The log turnover is defined as log((1+volume)/shares outstanding). At the end of June in each year, all firms are sorted based on Lius liquidity measure, LM12, the standardized turnover-adjusted number of zero daily trading volumes over prior 12 months. Based on the sort, stocks are divided into 10 LM12 groups. The breakpoints are determined based on all stocks listed on NYSE, AMEX, and NASDAQ. Low LM12 stocks are more liquid than high LM12 stocks. Relative day 0 is the announcement day. Day -10 and day 10 are 10 days before and 10 days after announcement day, respectively. The estimation period is the 30-day period from day -40 to day -11. T-statistics are used to test the null hypothesis that the number is not different from zero. ***, **, and * indicate that a number is significant different from zero at 1%, 5%, and 10%, respectively, from a two-tailed T test.

	1 Low LM12 (Liquid)	2	3	4	5	6	7	8	9	10 High LM12 (Illiquid)	10−1
# OBS	31663	32028	32126	31909	29938	26748	24133	21423	18325	11816	
(-10, -2)	-0.0223	-0.0935***	-0.0774***	-0.0974***	-0.1071***	-0.1933***	-0.1931***	-0.3087***	-0.3076***	-0.3722***	**-0.3498****
-1	0.1803***	0.1417***	0.1171***	0.1057***	0.1158***	0.1377***	0.1523***	0.1226***	0.1250***	0.0740**	**-0.1062*****
0	0.5233***	0.4791***	0.4474***	0.4164***	0.4294***	0.5031***	0.6305***	0.7554***	0.9461***	0.9425***	**0.4192*****
1	0.5917***	0.4894***	0.4358***	0.4097***	0.4144***	0.4804***	0.5750***	0.6850***	0.8732***	0.9538***	**0.3622*****
(2, 10)	0.5202***	0.7536***	0.8414***	0.9672***	1.0478***	1.0828***	1.2958***	1.6876***	2.3345***	2.9616***	**2.4414*****
(0, 2)	1.3691***	1.2174***	1.1211***	1.0548***	1.0821***	1.2728***	1.5695***	1.8760***	2.3685***	2.5227***	**1.1536*****

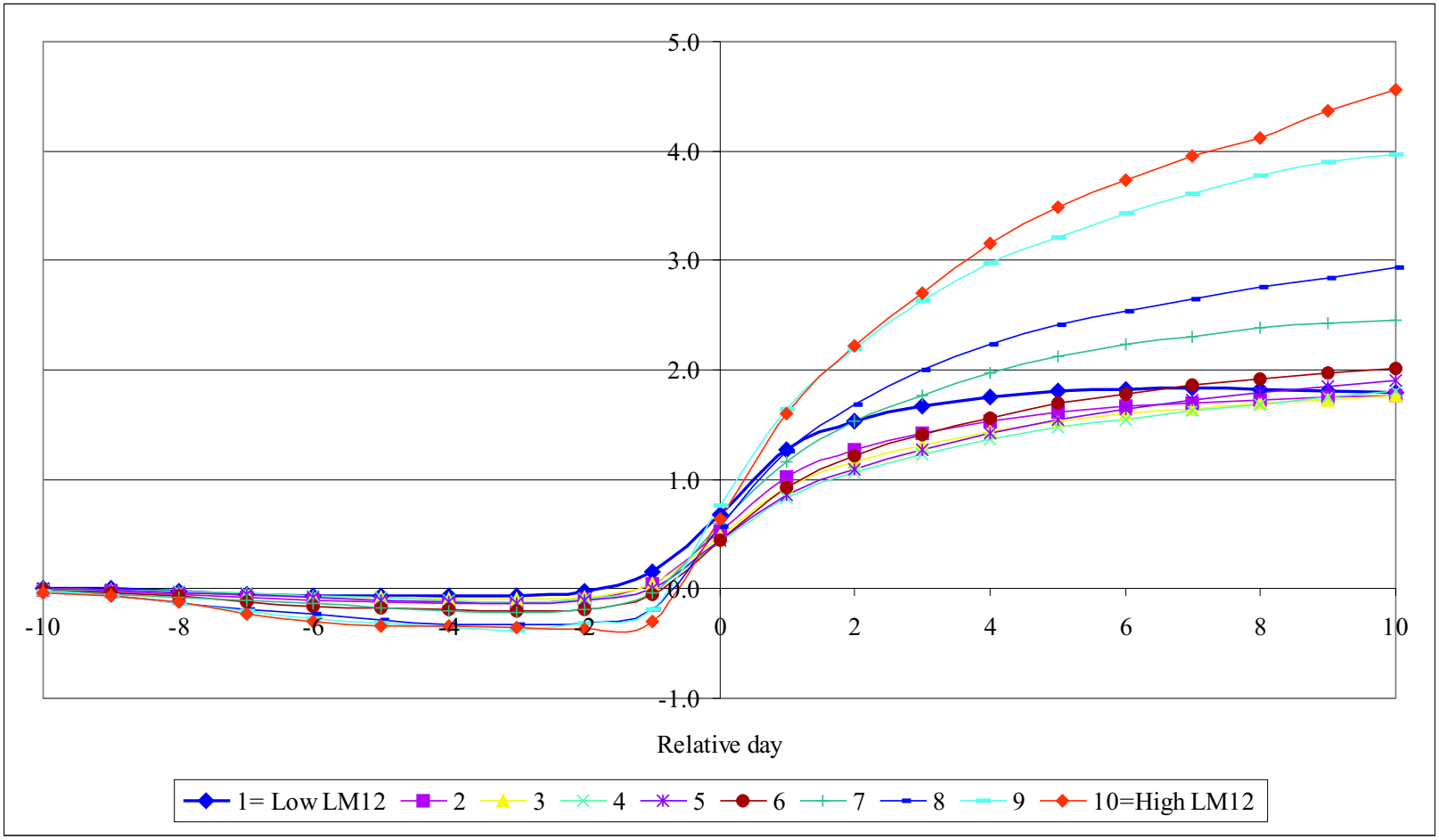

Figure 18: Cumulative Abnormal Volume during Quarterly Earnings Announcement Period

This figure shows the cumulative abnormal volume during quarterly earnings announcement periods. Sample includes 260,109 quarterly announcements of firms listed on NYSE/AMEX/NASDAQ from 1982 to 2004. The abnormal volume is calculated as the difference of log turnover on the event day and the average log turnover during the estimation period. The log turnover is defined as log((1+volume)/shares outstanding). The cumulative abnormal volume is the sum of abnormal volume since day −10.

announcements, in general, increase with LM12. The differences between high-LM12 stocks and low-LM12 stocks is significant at 5% level. This finding supports our second hypothesis. Because the abnormal return for low-LM12 also increases during this period and then drops significantly after the announcements, the trading market during this period for low-LM12 stocks is very likely to be dominated by speculative investors.

After the quarterly announcements, the volume pattern is reversed. The abnormal volume of high-LM12 stocks is significantly higher than that of low-LM12 stocks. Investigating the path of abnormal volume in Figure 18, we find that for low-LM12 stocks, the response of volume to the announcements is more efficient than for high-LM12 stocks. Since day 8, the abnormal volume of low-LM12 stocks even become negative. On the contrary, for high-LM12 stocks, the positive abnormal volume continues. The positive abnormal volume for low-LM12 stocks from day 0 to day 6 can be attributed to liquidity traders who postpone their trades until the uncertainty about earnings announcements is resolved. The negative abnormal volume from day 8 to day 10 may result from the revision of investors' overconfidence. It is possible that the earnings for low-LM12 stocks are not as good as overconfident investors had expected so that some of them revise their expectations and decrease speculative trading for low-LM12 stocks.

5.4 Robustness Check for Abnormal Volume

In this section, we do three robustness checks. First, to rule out the possibility that our results are driven by the particular model used in previous section, following Chae (2005), we also compute the abnormal volume from a one-factor market model. Specifically, we construct a value-weighted log turnover index on day t, $Log\ Turnover_{m,t}$, from

all NYSE/AMEX/NASDAQ stocks in CRSP and run a univariate regression during the estimation period to estimate the intercept and the coefficient of the index. The abnormal volume is then calculated from the following equation:

$$Abnormal\ Turnover_{i,t} = Log\ Turnover_{i,t} - \hat{\alpha}_i - \hat{\beta}_i Log\ Turnover_{m,t}. \quad (7)$$

In the second robustness check, we use only NYSE/AMEX stocks to test whether our results are affected by the differences of market microstructures between NYSE/AMEX and NASDAQ. In the last robustness test, we divide our sample into the bubble period and the non-bubble period in order to investigate whether the trading activities during the bubble period are different from those during the non-bubble period.

The results of the first two robustness checks are presented in panel A and panel B of Table 11. Their graphical summaries are shown in Figure 19 and Figure 20. When we use the one-factor market model, we observe that the abnormal trading volume during the period from day -10 to day -2 decreases with the increase of LM12. The difference between high-LM12 stocks and low-LM12 stocks is significant at 5% level. When we use only NYSE/AMEX stocks, the abnormal volume, in general, still decreases when LM12 increases before earnings announcements, although the difference between high-LM12 and low-LM12 stocks is not significant. These results still support our second hypothesis although they are not as strong as the results in section 5.3. They also indicates that there is less speculative trading for NYSE/AMEX stocks. If we examine only NASDAQ stocks, the results should be stronger.

Some issues may cause our results in section 5.3 and section 5.4 biased against significance. According to the definition in section 5.3, the abnormal volume is very close

Table 11: Robustness Check for Earnings Announcement Effect on Stock Volume

This table shows the abnormal volume during earnings announcement periods. Sample includes quarterly earnings announcements of firms listed on NYSE, AMEX, and NASDAQ from 1982 to 2004. At the end of June in each year, all firms are sorted based on Lius liquidity measure, LM12, the standardized turnover-adjusted number of zero daily trading volumes over prior 12 months. Based on the sort, stocks are divided into 10 LM12 groups. The breakpoints are determined based on all stocks listed on NYSE, AMEX, and NASDAQ. Low LM12 stocks are more liquid than high LM12 stocks. If not specified, the abnormal volume is calculated as the difference of log turnover on an event period and the average log turnover during the estimation period. The log turnover is defined as log((1+volume)/shares outstanding). Panel A shows the results when the abnormal volume is calculated from one-factor market model. During the estimation period (-40, -11), the coefficient of market log-volume index is estimated from a regression. Then during the event period, the abnormal volume is defined as the log turnover minus the benchmark log turnover estimated from the one-factor market model. Panel B reports the results for only NYSE/AMEX stocks. Panel C and Panel D show the results during bubble and non-bubble periods, respectively. In all panels, T-statistics are used to test the null hypothesis that the number is not different from zero. ***, **, and * indicate that a number is significant different from zero at 1%, 5%, and 10%, respectively, from a two-tailed T test.

Panel A: Abnormal volume from one-factor market model

	1 Low LM12 (Liquid)	2	3	4	5	6	7	8	9	10 High LM12 (Illiquid)	10−1
# OBS	31663	32028	32126	31909	29938	26748	24133	21423	18325	11816	
(-10, -2)	-0.2319***	-0.2992***	-0.3036***	-0.3521***	-0.3641***	-0.3841***	-0.3761***	-0.4885***	-0.4473***	-0.5121***	**-0.2802****
-1	0.1495***	0.1102***	0.0841***	0.0692***	0.0785***	0.1103***	0.1321***	0.1033***	0.1160***	0.0743**	**-0.0752****
0	0.4895***	0.4471***	0.4075***	0.3769***	0.3895***	0.4724***	0.6152***	0.7343***	0.9340***	0.9379***	**0.4484*****
1	0.5581***	0.4594***	0.3982***	0.3717***	0.3766***	0.4534***	0.5545***	0.6655***	0.8582***	0.9511***	**0.3930*****
(2, 10)	0.3994***	0.6748***	0.7190***	0.8269***	0.9012***	1.0332***	1.2880***	1.7178***	2.4397***	3.0764***	**2.6770*****
(0, 2)	1.2846***	1.1388***	1.0202***	0.9539***	0.9788***	1.1975***	1.5266***	1.8245***	2.3357***	2.5134***	**1.2288*****

Panel B: Abnormal volume for only NYSE/AMEX stocks

	1 Low LM12 (Liquid)	2	3	4	5	6	7	8	9	10 High LM12 (Illiquid)	10−1
# OBS	13167	13299	13518	13055	13031	12384	11268	10982	9231	6365	
(-10, -2)	0.0088	0.0061	-0.032	0.0156	-0.1168***	-0.1343***	-0.1066**	-0.1508**	-0.2721***	-0.1921	**-0.2009**
-1	0.1627***	0.1414***	0.1282***	0.1003***	0.0782***	0.0740***	0.1032***	0.1349***	0.1086***	0.2006***	**0.0379**
0	0.5155***	0.4903***	0.4350***	0.3997***	0.3471***	0.3209***	0.3768***	0.5363***	0.6666***	1.1309***	**0.6154*****
1	0.4681***	0.4406***	0.4048***	0.3862***	0.3417***	0.3169***	0.3462***	0.4580***	0.5874***	0.9418***	**0.4737*****
(2, 10)	0.6057***	0.8349***	0.9303***	0.9685***	0.8922***	0.9128***	1.0680***	1.1692***	1.4439***	2.6268***	**2.0211*****
(0, 2)	1.2166***	1.1705***	1.0649***	1.0098***	0.8931***	0.8320***	0.9416***	1.2883***	1.6160***	2.7046***	**1.4880*****

Table 11 continued

Panel C: Abnormal volume for announcements during the bubble period

	1 Low LM12 (Liquid)	2	3	4	5	6	7	8	9	10 High LM12 (Illiquid)	10−1
# OBS	4465	4404	4467	4635	4661	4089	3888	3453	3139	2115	
(-10, -2)	0.2495***	0.1232	0.3391***	0.2428***	0.1463**	0.1603*	0.5530***	0.4180**	0.1809	0.0162	**-0.2334**
-1	0.1639***	0.1070***	0.1130***	0.0630***	0.0422***	0.0790***	0.1332***	0.0585	0.0688	0.0992	**-0.0647**
0	0.5058***	0.5122***	0.4972***	0.4352***	0.3501***	0.4099***	0.6143***	0.7010***	0.8439***	0.9760***	**0.4702*****
1	0.7444***	0.6152***	0.5219***	0.4687***	0.3711***	0.4476***	0.5772***	0.7149***	0.7420***	0.8093***	**0.0649**
(2, 10)	0.8273***	1.1557***	1.2676***	1.3297***	1.2405***	1.2733***	1.8887***	2.0314***	2.3245***	2.7010***	**1.8737*****
(0, 2)	1.5635***	1.4380***	1.3233***	1.1771***	0.9557***	1.1256***	1.5809***	1.8707***	2.0117***	2.3827***	**0.8191*****

Panel D: Abnormal volume for announcements during the non-bubble period

	1 Low LM12 (Liquid)	2	3	4	5	6	7	8	9	10 High LM12 (Illiquid)	10−1
# OBS	27198	27624	27659	27274	25277	22659	20245	17970	15186	9701	
(-10, -2)	-0.0670**	-0.1280***	-0.1446***	-0.1552***	-0.1538***	-0.2571***	-0.3364***	-0.4484***	-0.4085***	-0.4568***	**-0.3899****
-1	0.1829***	0.1472***	0.1178***	0.1130***	0.1294***	0.1483***	0.1560***	0.1349***	0.1367***	0.0685*	**-0.1144*****
0	0.5261***	0.4739***	0.4393***	0.4132***	0.4440***	0.5199***	0.6336***	0.7658***	0.9673***	0.9352***	**0.4091*****
1	0.5666***	0.4694***	0.4218***	0.3997***	0.4224***	0.4863***	0.5746***	0.6793***	0.9003***	0.9854***	**0.4188*****
(2, 10)	0.4698***	0.6896***	0.7727***	0.9056***	1.0122***	1.0485***	1.1820***	1.6215***	2.3366***	3.0184***	**2.5486*****
(0, 2)	1.3372***	1.1823***	1.0884***	1.0340***	1.1055***	1.2993***	1.5673***	1.8770***	2.4422***	2.5533***	**1.2161*****

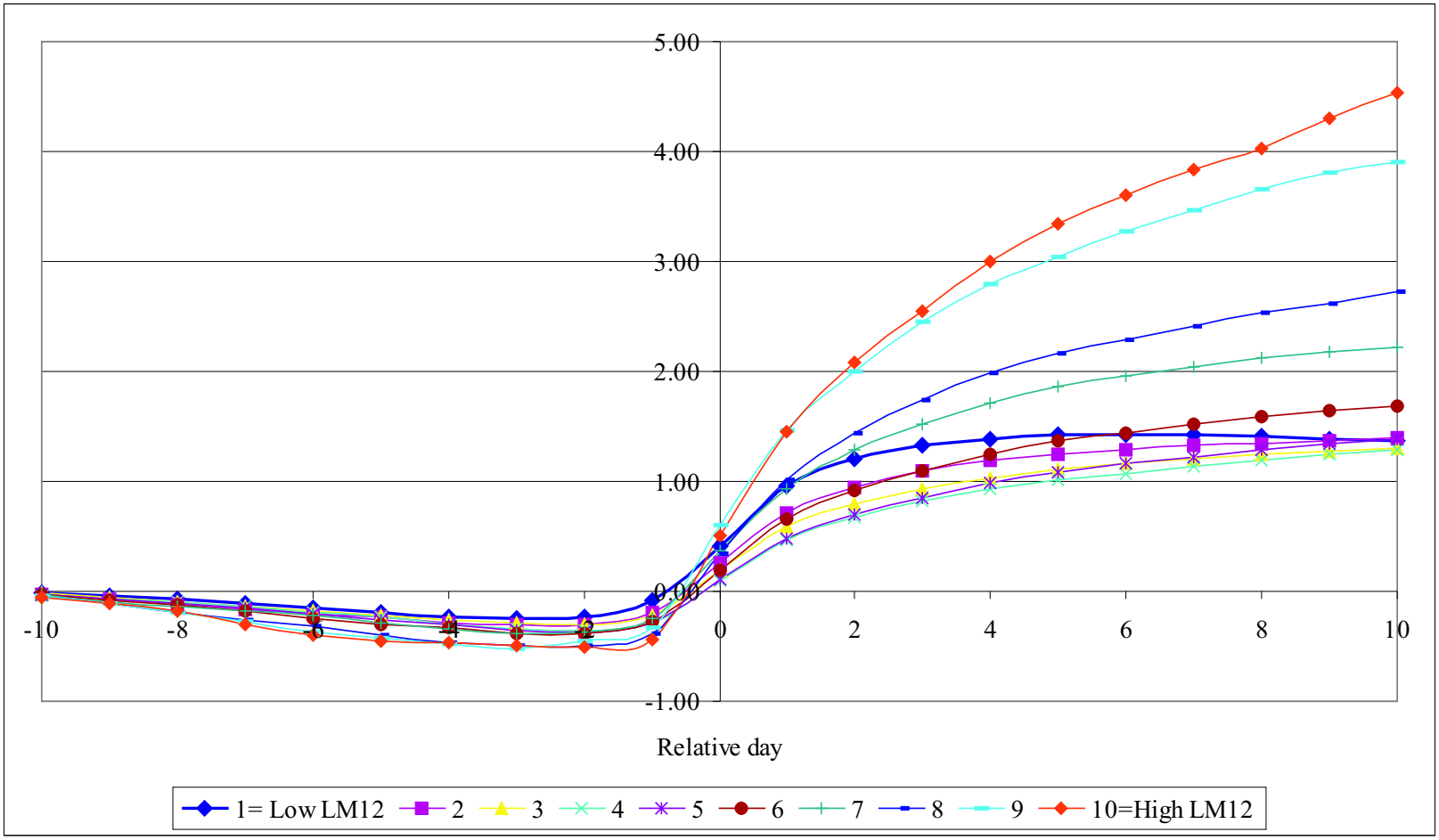

Figure 19: Cumulative Abnormal Volume during Quarterly Earnings Announcement Period: One-Factor Market Model

This figure shows the cumulative abnormal volume during quarterly earnings announcement periods. Sample includes quarterly announcements of firms listed on NYSE/AMEX/NASDAQ from 1982 to 2004 The abnormal volume (log turnover) is calculated from one-factor market model. The log turnover is defined as log((1+volume)/shares outstanding). The cumulative abnormal volume is the sum of abnormal volume since day −10.

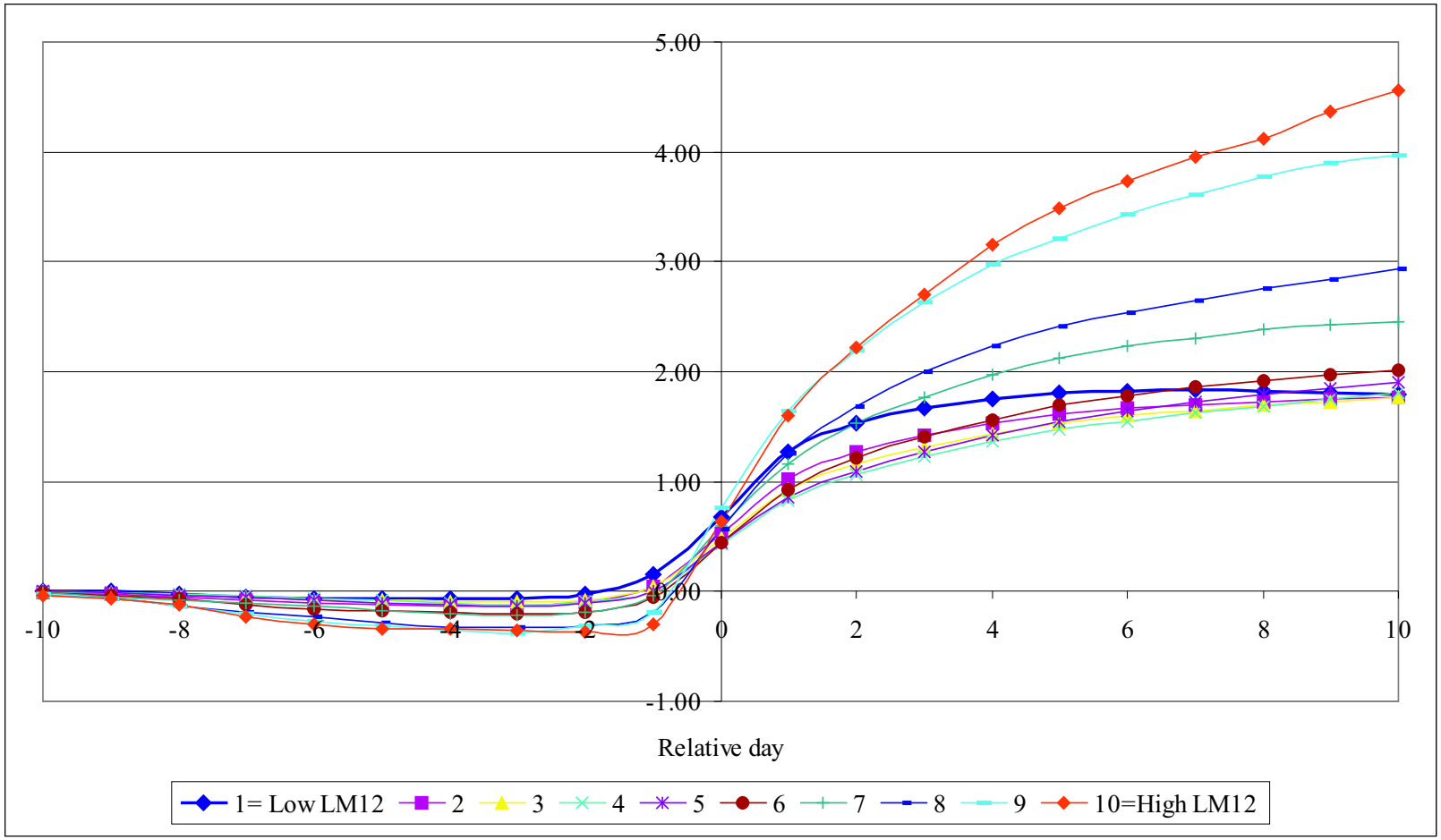

Figure 20: Cumulative Abnormal Volume during Quarterly Earnings Announcement Period for NYSE/AMEX Stocks

This figure shows the cumulative abnormal volume during quarterly earnings announcement periods for only NYSE/AMEX stocks. Sample includes quarterly announcements of firms listed on NYSE/AMEX from 1982 to 2004. The abnormal volume is calculated from the difference between log turnover on the event day and the average log turnover during the estimation period $(-40, -11)$. The log turnover is defined as log((1+volume)/shares outstanding). The cumulative abnormal volume is the sum of abnormal volume since day -10.

to the percentage change in volume. However, 1% decrease in volume for illiquid stocks is more difficult than 1% decrease for liquid stocks and 1% increase in volume for liquid stocks is more difficult than 1% increase for illiquid stocks. Therefore, if the percentage decreases for two stocks are the same, the decrease may mean more to illiquid stocks than to liquid stocks. Furthermore, prior to the quarterly announcements, liquidity traders postpone their trades but speculative traders and informed traders trade aggressively. Because liquidity investors may prefer liquid stocks so that they can sell the stocks easily at any time, prior to the quarterly announcements, the volume drop for liquid stocks due to liquidity traders' withdrawal may be larger than that for illiquid stocks. As a result, even if liquid stocks show the same magnitude of volume drop as illiquid stocks, they tend to have more speculative trading to offset larger withdrawal from discretionary liquidity traders. Despite the above possible biases against our hypothesis, in section 5.3 we still find that liquid stocks show a significant smaller drop in volume than illiquid stocks. Therefore, our results support the second hypothesis quite well.

In panel C and panel D of table 11, we show the results for announcements during the bubble period and the non-bubble period. The graphical summaries are presented in Figure 21 and Figure 22. We find the trading activities prior to quarterly earnings announcements during the bubble period are very different from those during the non-bubble period. During the bubble period, in general, the trading volume prior to quarterly earnings announcements increases. This suggests that there may be significant speculative trading prior to the quarterly earnings announcements. Although the lowest LM12 decile does not show the highest increase in volume, considering that 20% increase in volume is

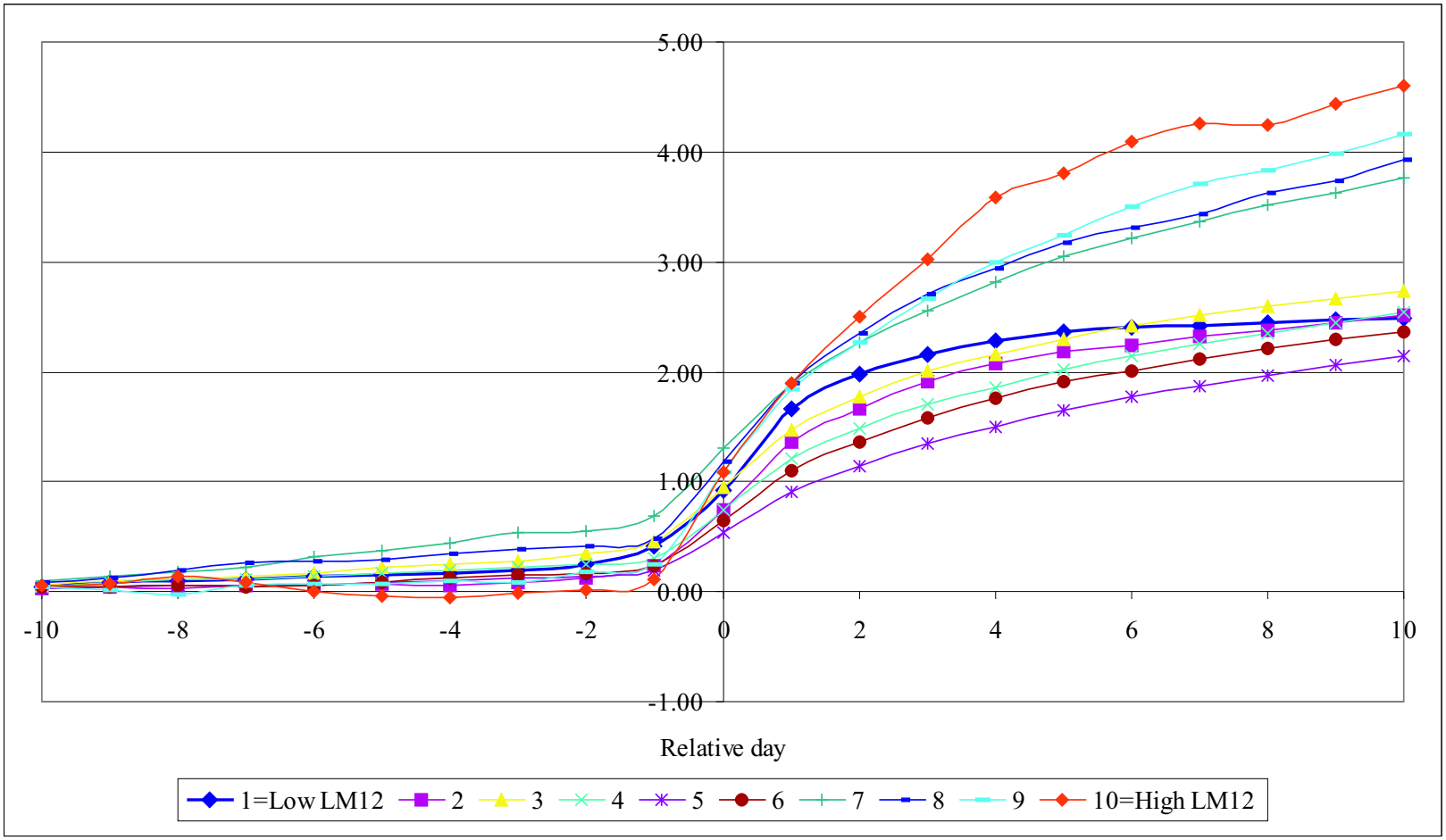

Figure 21: Cumulative Abnormal Volume around Quarterly Earnings Announcement during Internet Bubble Period

This figure shows the cumulative abnormal volume around quarterly earnings announcement during the period from Jan.1998 to Feb 2000. The abnormal volume is calculated as the difference of log turnover on the event day and the average log turnover during the estimation period. The log turnover is defined as log((1+volume)/shares outstanding). The cumulative abnormal volume is the sum of abnormal volume since day −10.

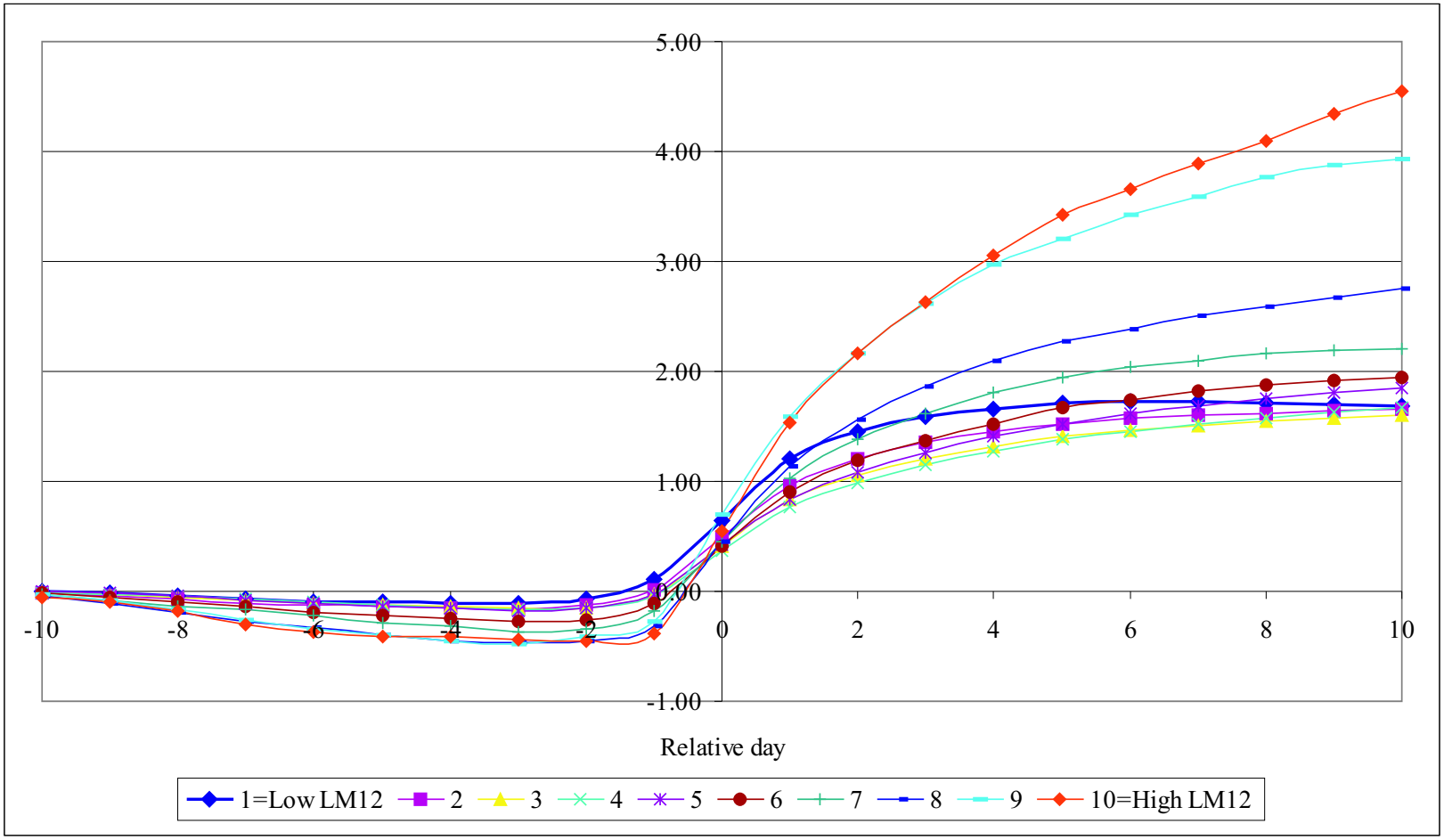

Figure 22: Cumulative Abnormal Volume around Quarterly Earnings Announcement during Non-Bubble Period

This figure shows the cumulative abnormal volume around quarterly earnings announcement. Sample includes quarterly announcements of firms listed on NYSE/AMEX/NASDAQ from 1982 to 2004, excluding the period from Jan.1998 to Feb 2000. The abnormal volume is calculated as the difference of log turnover on the event day and the average log turnover during the estimation period. The log turnover is defined as log((1+volume)/shares outstanding). The cumulative abnormal volume is the sum of abnormal volume since day −10.

more difficult for liquid stocks than for illiquid stocks, we think that the results still show pronounced speculative trading for low-LM12 stocks. During the non-bubble period, we observe that trading volume decreases with the increase of LM12 prior to the announcements. The magnitude is stronger during the non-bubble period than during the full sample period. Therefore, the speculative trading is affected by the sentiment toward individual stocks as well as by the market-wide sentiment. When the market-wide sentiment is high, even illiquid stocks still have speculative trading. Therefore, during the high-sentiment period, the differences of speculative trading between high-LM12 and low-LM12 stocks are not as high as the differences during the low-sentiment period. These results suggest that investor sentiment does affect trading volume.

5.5 Liquidity Premium Realized during Quarterly Earnings Announcement Periods

Liu (2006) documents a liquidity premium, return of high-LM12 stocks minus return of low-LM12 stocks, of 0.682% per month for NYSE/AMEX stocks and 0.906% for NASDAQ stocks over a 12-month holding periods. In section 5.1, we find high-LM12 stocks earn significantly higher abnormal returns than low-LM12 stocks around quarterly earnings announcements. This implies that there may be a significant proportion of the annual liquidity premium realized during the earnings announcement periods. In this section, we calculate how much annual liquidity premium is realized during the 3-day event window right after quarterly earnings announcements. Table 12 shows the results. We find the average annual return is 8.13% for low-LM12 stocks and 20.27% for high-LM12 stocks. Thus, the annual liquidity premium in our sample is 12.15%.

Table 12: Liquidity Premium Realized during Quarterly Earnings Announcement Periods

This table shows the returns realized during quarterly earnings announcement periods from 1983 to 2004. In each year from July year t to June year t+1, the annual raw return of firm i is calculated as $\prod_{mon=jul,yr\ t}^{jun,yr\ t+1}(1+R_{i,mon})-1$. The market-adjusted annual return of firm i is defined as $\prod_{mon=jul,yr\ t}^{jun,yr\ t+1}(1+R_{i,mon})-\prod_{mon=jul,yr\ t}^{jun,yr\ t+1}(1+R_{m,mon})$. For each announcement, the raw return and market adjusted return during the event period is defined as$\prod_{d=0}^{2}(1+R_{i,d})-1$ and $\prod_{d=0}^{2}(1+R_{i,d})-\prod_{d=0}^{2}(1+R_{m,d})$, respectively. For each stock, the average of all four quarterly announcements during the year from July year t to June year $t+1$ is calculated first. If a stock has missing announcements, the return of the missing announcement is replaced with the average returns of all other quarterly announcements during the same year. In each year, the cross-sectional mean of each LM12 group is calculated first. Then the time-series average of each LM12 group during the sample period is obtained. Non-event day return is the difference between annual return and event-day return. Each year, the difference of return between low-LM12 group and high-LM12 group is taken and T-statistics is used to test the null hypothesis that the differences are not different from zero. ***, **, and * indicate that a number is significant different from zero at 1%, 5%, and 10%, respectively, from a two-tailed T test.

LM12 Group	Raw Return				Market-Adjusted Return			
	Average # firms per year	Annual return	Event day (0, 2)	Non-event day	Average # firms per year	Annual return	Event day (0, 2)	Non-event day
1 = low LM12	360	8.13%	-0.94%	9.07%	360	-4.39%	-1.52%	-2.87%
2	368	11.83%	0.43%	11.41%	368	-0.68%	-0.22%	-0.45%
3	369	14.30%	0.69%	13.61%	369	1.78%	0.11%	1.67%
4	371	15.13%	1.00%	14.12%	371	2.61%	0.50%	2.11%
5	349	14.15%	0.95%	13.19%	349	1.63%	0.34%	1.30%
6	313	15.80%	0.91%	14.89%	313	3.29%	0.23%	3.06%
7	287	18.18%	1.37%	16.81%	287	5.67%	0.70%	4.97%
8	257	18.19%	2.28%	15.91%	257	5.67%	1.55%	4.12%
9	224	19.51%	3.35%	16.16%	224	7.00%	2.68%	4.31%
10 = high LM12	153	20.27%	4.59%	15.68%	153	7.76%	4.06%	3.70%
10-1		**12.15%****	**5.54%*****	**6.61%**		**12.15%****	**5.58%*****	**6.57%**

Before we compare the liquidity premium in our sample with Liu's (2006), we discuss the differences between our sample and Liu's sample. First, Liu separates NYSE/AMEX from NASDAQ; while we mix all stocks from NYSE, AMEX, and NASDAQ together. Because the return variation for NASDAQ stocks is higher than that for NYSE/AMEX stocks, even though we combine all stocks together, we expect the liquidity premium in our sample is more close to Liu's NASDAQ sample than NYSE/AMEX sample. Second, because our sample comes from the intersection of CRSP and I/B/E/S, it also reflects analysts' preference. If analysts tend to follow firms which perform well and drop their coverage of poor-performed firms, the returns we find would be biased toward well-performed firms.

Despite the above differences between our sample and Liu's sample, we still find a similar magnitude of the liquidity premium to Liu's NASDAQ sample. In Table A.2 of Liu (2006), the lowest-LM12 decile earn 0.559% per month. If we compound the monthly return to generate an annual return, the lowest-LM12 stocks earn 6.92% per year. For the highest-LM12 decile, the return is 1.466% per month, which is equivalent to 19.08% per year. As a result, the annual liquidity premium of Liu's NASDAQ sample is 12.16%, which is very close to our estimate of 12.15%.

In Table 12, we find that about 5.54% raw liquidity premium and 5.58% market-adjusted liquidity premium realized during only 12 days right after earnings announcements (3-day period from day 0 to day 2 for four quarterly earnings announcements). Both of the raw and market-adjusted liquidity premium realized during the quarterly earnings announcement periods are significant at 1% level. During the non-event periods, the raw liquidity premium is 6.61% and the market-adjusted liquid premium is 6.57%. Although

their magnitude is not trivial, liquidity premiums realized during non-event periods are not significant because their time-series variation is high.

To investigate whether the liquidity premium realized during earnings announcement periods distributes evenly over four quarters, we further classify each announcement into one of the four quarters and redo the analysis. Table 13 provides the results. The liquidity premium is 4.22% during the first calendar quarter, 2.11% during the second calendar quarter, 6.29% during the third calendar quarter, and −5.07% during the fourth calendar quarter. The Internet bubble affects the liquidity premium more significantly in the fourth quarter than in other quarters. When we exclude the period from Jan. 1998 to Jun. 2000, the liquidity premiums from the first calendar quarter to the fourth calendar quarter become 6.17%, 1.99%, 6.27%, and −1.88%, respectively. The variation of the liquidity premiums in different quarters may result from the differences of seasonality between liquid and illiquid firms. Another possible reason is that the market-wide investors sentiment may change systematically during different quarters. For example, if in the fourth calendar quarter investors sentiment tend to be higher than any other quarters, during this period liquid stocks may be highly overvalued, which results in a negative liquidity premium.

Examining the 3-day abnormal return during quarterly earnings announcements, we find that announcements made during the first and third calendar quarters exhibit higher differences of abnormal returns between liquid and illiquid stocks than announcements in the second and fourth calendar quarters. Because the fiscal year of most firms ends in December, in our sample about 68% of quarterly announcements made from Jan. to Mar. are combined with annual reports. The differences of degree of speculative trading between

Table 13: Liquidity Premium Realized during Quarterly Earnings Announcement Periods in Different Quarters

This table shows the return realized during quarterly earnings announcement periods from 1983 to 2004 in different quarters. Panel A, B, C, and D provide realized return for announcements from Jul. to Sep., from Oct. to Dec., from Jan. to Mar., and from Apr. to Jun., respectively. For each announcement, the raw return and market adjusted return during the event period is defined as $\prod_{d=0}^{2}(1+R_{i,d})-1$ and $\prod_{d=0}^{2}(1+R_{i,d})-\prod_{d=0}^{2}(1+R_{m,d})$, respectively. In each quarter, the cross-sectional mean of each LM12 group is calculated first. Then the time-series average of each LM12 group is obtained. Each year, the difference of return between low-LM12 group and high-LM12 group is taken and T-statistics is used to test the null hypothesis that the differences are not different from zero. ***, **, and * indicate that a number is significant different from zero at 1%, 5%, and 10%, respectively, from a two-tailed T test.

Panel A: Announcement from Jul. to Sep.

LM12	Announcement from Jul. to Sep.				
	Average #OBS	Raw Return		Market-adjusted Return	
		Quarterly Return	3-day (0, 2)	Quarterly Return	3-day (0, 2)
1=low LM12	370.95	-3.99%	-0.66%	-3.46%	-0.68%
2	374.86	-2.28%	-0.33%	-1.75%	-0.33%
3	374.86	-1.64%	-0.17%	-1.12%	-0.13%
4	372.45	-0.66%	0.00%	-0.14%	0.05%
5	350.14	-0.41%	0.12%	0.11%	0.17%
6	313.36	0.40%	-0.09%	0.93%	-0.06%
7	282.18	-0.31%	0.02%	0.21%	0.03%
8	252.41	0.90%	0.03%	1.42%	-0.01%
9	217.77	3.00%	0.70%	3.53%	0.73%
10 = high LM12	142.41	2.31%	1.12%	2.83%	1.19%
10-1		**6.29%****	**1.78%*****	**6.29%****	**1.87%*****

Panel B: Announcement from Oct. to Dec.

LM12	Announcement from Oct. to Dec.				
	Average #OBS	Raw Return		Market-adjusted Return	
		Quarterly Return	3-day (0, 2)	Quarterly Return	3-day (0, 2)
1=low LM12	366.73	5.98%	-0.12%	0.91%	-0.25%
2	371.95	4.64%	0.21%	-0.43%	-0.01%
3	373.32	4.84%	0.22%	-0.23%	0.02%
4	369.55	5.14%	0.15%	0.07%	0.03%
5	346.27	4.09%	0.21%	-0.98%	0.02%
6	310.36	2.60%	0.22%	-2.47%	0.01%
7	282.09	2.71%	0.44%	-2.37%	0.17%
8	249.41	2.29%	0.72%	-2.78%	0.50%
9	215.82	1.76%	0.36%	-3.31%	0.16%
10 = high LM12	138.27	0.91%	0.60%	-4.16%	0.34%
10-1		**-5.07%**	**0.72%**	**-5.07%**	**0.59%**

Table 13 continued

Panel C: Announcement from Jan. to Mar.

LM12	Announcement from Jan. to Mar.				
	Average #OBS	Raw Return		Market-adjusted Return	
		Quarterly Return	3-day (0, 2)	Quarterly Return	3-day (0, 2)
1=low LM12	352.95	7.47%	-0.19%	3.06%	-0.41%
2	356.76	7.72%	0.00%	3.31%	-0.18%
3	362.38	7.19%	0.32%	2.78%	0.11%
4	361.67	7.67%	0.42%	3.26%	0.21%
5	337.71	7.71%	0.32%	3.29%	0.11%
6	296.95	9.05%	0.40%	4.64%	0.20%
7	264.67	10.84%	0.46%	6.43%	0.27%
8	228.95	11.66%	0.74%	7.25%	0.54%
9	195	12.13%	1.06%	7.72%	0.85%
10 = high LM12	124.29	11.70%	1.35%	7.29%	1.14%
10-1		**4.22%**	**1.54%*****	**4.22%**	**1.56%*****

Panel D: Announcement from Apr. to Jun.

LM12	Announcement from Apr. to Jun.				
	Average #OBS	Raw Return		Market-adjusted Return	
		Quarterly Return	3-day (0, 2)	Quarterly Return	3-day (0, 2)
1=low LM12	362.14	2.87%	0.05%	-1.00%	-0.16%
2	367.9	4.77%	0.44%	0.90%	0.21%
3	367.24	5.21%	0.31%	1.34%	0.11%
4	367.29	4.87%	0.47%	1.00%	0.24%
5	343.29	4.38%	0.45%	0.51%	0.19%
6	308.14	5.24%	0.46%	1.36%	0.18%
7	276.81	5.29%	0.61%	1.41%	0.36%
8	249.43	5.46%	0.67%	1.59%	0.43%
9	208.14	5.05%	1.01%	1.18%	0.77%
10 = high LM12	133.86	4.98%	1.24%	1.11%	0.98%
10-1		**2.11%**	**1.19%*****	**2.11%**	**1.14%*****

annual announcements and quarterly announcements may be the reason for higher liquidity premium for announcements in the first calendar quarters. Because there is more information released from analysts and media before annual announcements, investors may disagree about the precision of the available information. In Scheinkman and Xiong's (2003) framework, the speculative component of stock prices is higher when information available enlarges the differences in beliefs. If we think that the liquidity premium around quarterly earnings announcements reflects investors' adjustments of their mispricing after

the announcements, the higher liquidity premium of announcements in the first calendar quarter support Scheinkman and Xiong (2003). However, the reason for higher liquidity premium for announcements in the third calendar quarter is not clear. Prior studies which are related to cross-quarter differences of earnings announcements usually compare the fourth fiscal quarter (annual announcement) with all of the interim quarters. It is not clear why the third calendar quarter is different from the second and fourth calendar quarters. A possible reason is the sales seasonality which results in different earnings quality in different interim quarters.

To sum up, if we focus on the 3-day event period from day 0 to day 2, the liquidity premium realized during the 12 days around quarterly earnings announcements is 5.54%. It is about 45.6% of the annual liquidity premium. It is unlikely that investors require 5.54% over 12 days just to compensate liquidity risk. We believe that the 5.54% also reflect investors' adjustment of mispricing. Because there is more speculative trading for low-LM12 stocks, the prices of low-LM12 stocks contain a higher speculative component than the prices of high-LM12 stocks. After quarterly earnings announcements, investors of low-LM12 stocks revise their overconfidence to some degree and thus the mispricing is partially corrected, which leads to a lower announcement returns for low-LM12 stocks than for high-LM12 stocks.

5.6 Multivariate Regression

The event study in previous sections provides univariate or bivariate tests. It cannot control many variables at the same time. Because the earnings announcements contain information about a firm's fundamental value, even though the risk of the firm does not

change during the short event window, the liquidity premium realized during this period may be affected by both of the information innovation and the adjustment of mispricing. Therefore, in this section, we construct a Fama-Macbeth (1973) type regression which controls possible factors that may affect abnormal returns around the announcements. If the difference of abnormal returns between high-LM12 and low-LM12 firms reflect investors' correction of their mispricing, we should observe a significant positive coefficient for LM12.

For each quarterly earnings announcement made between July year t to June year $t+1$, we calculate the following variables:

$LM12$ - LM12 at the end of June in year t (estimated from July year $t-1$ to June year t).

$Size$ - Log Market value (shares outstanding times price, in millions) at the end of June at year t.

B/M - Log book-to-market ratio. Book value is obtained from the annual report in year $t-1$. Market value is estimated at the end of December in year $t-1$.

$Error$ - Analyst forecast error which equals actual earnings per share minus the consensus of analysts' forecast right before the announcement deflated by the stock price at the end of June in year t.

$\Delta Growth$ - Difference between the mean analysts' estimate of long-term growth right before and right after the quarterly earnings announcement.

$\#Analyst$ - Number of analysts following right before the announcement.

$Dispersion$ - Standard deviation of analysts' earnings forecasts right before the announcement.

$LiqUp$ - Dummy variable which equals to 1 if a firm moves from a higher LM12 decile to

a lower LM12 decile from June year t to June year $t+1$.

LiqDown - Dummy variable which equals to 1 if a firm moves from a lower LM12 decile to a higher LM12 decile from June year t to June year $t+1$.

$\Delta\sigma$ - Changes of return volatility from the period (-40, -11) to period (11,40).

$\Delta\beta_{MKTRF}$ - Changes of systematic risk from the period (-40, -11) to period (11,40).

$\Delta\beta_{SMB}$ - Changes of sensitivity to SMB from the period (-40, -11) to period (11,40).

$\Delta\beta_{HML}$ - Changes of sensitivity to HML from the period (-40, -11) to period (11,40).

In Table 14, we provide the summary statistics of the explanatory variables used in the regression. The I/B/E/S actuals database which provides the earnings announcement dates has a larger coverage than the I/B/E/S summary database which provides analysts' forecasts. Although our sample from the intersection of I/B/E/S and CRSP, on average, contains 2768 announcements per quarter, 46.67% of observations do not have forecast dispersions, 31.30% do not have analysts' earnings forecasts, and 40.74% do not have analysts' growth forecasts. Regression analysis requires no missing value for all independent variables. If we delete all observations which contain any missing value, on average, we lose about 49% of observations per quarter.

As La Porta (1996) argues, the coverage of I/B/E/S summary files is heavily biased. From panel A of Table 14, we find the sample firms without any missing value in I/B/E/S tend to be large, liquid, growth firms with much more analysts following, higher forecast accuracy, lower forecast dispersions, and larger downward growth revises. On the contrary, stocks in the sample that contains missing value in I/B/E/S are small, illiquid, value stocks. The average LM12 of these stocks is 21.43. This means, on average, these stocks do not

Table 14: Summary Statistics of Regression Variables

This table provides summary statistics of regression variables. Panel A shows the average of quarterly means of each variable for 82 quarters from Jul. 1984 to Dec. 2004 for samples which excludes and includes OBS with missing values in I/B/E/S. Panel B shows the time-series average of cross-sectional correlation coefficients for the sample which includes OBS with missing values in I/B/E/S. For each announcement during the period from July year t to June year $t+1$, the following variables are calculated: LM12 (LM12 estimated from July year $t-1$ to June year t), size (log market value (in millions) at the end of June at year t), B/M (log book-to-market ratio; book value from the annual report in year $t-1$ over market value at the end of Dec year $t-1$), Error (analysts?forecast error over price in June year t, in percentage), ΔGrowth (difference in percentage between the analysts?long-term growth forecasts right before and after the announcement, in percentage), # Analyst (number of analyst following), Dispersion (standard deviation of analysts?earnings forecast), LiqUp (dummy variable which equals to 1 if liquidity is upgrade from June year t to June year $t+1$), LiqDown (dummy variable which equals to 1 if liquidity is downgrade from June year t to June year $t+1$), $\Delta\beta_{MKTRF}$ (changes of systematic risk from (-40, -11) to (11,40)), $\Delta\beta_{SMB}$ (changes of sensitivity to SMB from (-40, -11) to (11,40)), $\Delta\beta_{HML}$ (changes of sensitivity to HML from (-40, -11) to (11,40)),)), $\Delta\sigma$ (changes of return volatility from (-40, -11) to (11,40), in percentage), NoEr (dummy which equals to 1 when analysts?forecast error is not found from I/B/E/S), NoGth (dummy which equals to 1 when long-term growth is not found from I/B/E/S), and Nodps (dummy which equals to 1 when forecast dispersion is not found from I/B/E/S).

Panel A: Mean statistics for different sample

	Sample excludes all missing OBS in I/B/E/S	Sample with missing OBS in I/B/E/S	Sample includes all missing OBS in I/B/E/S
Average OBS each quarter	1399.51	1368.57	2768.09
LM12	1.6422	21.4289	11.4905
Size	6.4265	4.1773	5.3057
B/M	-0.7364	-0.3701	-0.5527
Error	-0.3947	-0.8458	-0.6126
# Analyst	6.6222	1.3215	3.5719
Dispersion	0.0409	0.0918	0.0239
LiqUp	0.2251	0.2305	0.2275
LiqDown	0.2679	0.3182	0.2942
$\Delta\beta_{MKTRF}$	-0.0107	-0.0111	-0.011
$\Delta\beta_{SMB}$	0.002	-0.0008	0.0019
$\Delta\beta_{HML}$	-0.0195	-0.0098	-0.0053
ΔGrowth	-0.1088	-0.054	-0.0602
$\Delta\sigma$	-0.0674	0.0082	-0.0304
NoEr	0	0.6126	0.313
NoDps	0	0.9307	0.4667
NoGth	0	0.8105	0.4074

Table 14 continued

Panel B: Correlation Matrix

	LM12	Size	B/M	Error	ΔGrowth	# Analyst	Dispersion	Liq-Up	Liq-Down	$\Delta\beta_{MKTRF}$	$\Delta\beta_{SMB}$	$\Delta\beta_{HML}$	$\Delta\sigma$	NoGth	NoEr	NoDps
LM12	1															
Size	-0.437	1														
B/M	0.233	-0.278	1													
Error	0.012	0.024	-0.027	1												
ΔGrowth	0.011	-0.004	0.022	0.007	1											
# Analyst	-0.284	0.728	-0.232	0.008	-0.016	1										
Dispersion	-0.070	0.105	0.017	-0.159	-0.009	0.120	1									
LiqUp	0.001	-0.024	-0.014	0.009	0.009	-0.050	0.000	1								
LiqDown	-0.123	-0.092	0.030	-0.008	-0.004	-0.079	-0.016	-0.345	1							
$\Delta\beta_{MKTRF}$	0.000	-0.001	0.002	-0.002	-0.002	0.000	0.002	0.006	-0.008	1						
$\Delta\beta_{SMB}$	-0.001	-0.002	0.002	-0.003	-0.001	0.000	0.002	0.005	-0.007	0.530	1					
$\Delta\beta_{SMB}$	-0.002	0.000	-0.002	0.002	-0.003	-0.002	-0.002	0.001	-0.004	0.579	0.342	1				
$\Delta\sigma$	0.009	-0.018	0.010	-0.016	0.006	-0.014	-0.004	-0.005	0.001	0.124	0.093	0.015	1			
NoGth	0.368	-0.551	0.190	0.004	0.028	-0.574	-0.129	0.001	0.048	0.001	0.001	0.001	0.019	1		
NoEr	0.387	-0.481	0.200	0.032	0.022	-0.515	-0.131	-0.023	0.036	0.001	0.000	0.001	0.020	0.799	1	
NoDps	0.370	-0.590	0.226	-0.003	0.026	-0.656	-0.186	-0.002	0.061	0.000	-0.001	0.001	0.018	0.748	0.708	1

have trades for one month per year. If we delete the observations which have missing value of analysts' earnings forecasts, growth forecasts, and forecast dispersions, our result will be biased toward large, liquid firms. Furthermore, because the average LM12 is 1.64 for the sample without any missing value in I/B/E/S, these stocks are quite liquid. As a result, the degree of mispricing among these stocks may be similar, which may lead to insignificant regression results. To avoid losing too many observations at one time and to increase the variation of LM12, we run stepwise regressions which include one of the forecast errors, forecast dispersions, and changes of growth forecasts at one time. We also construct a full-sample regression which sets the missing values of forecast errors, growth revisions, and forecast dispersions zero and includes three dummy variables, $NoEr$, $NoGth$, and $Nodps$, for the missing value in forecast errors, growth revisions, and forecast dispersions, respectively.

Panel B of Table 14 reports the averages of the quarter by quarter cross-sectional correlations of variables we use in regressions. The correlations are the highest between $Size$ and $\#Analyst$, $NoGth$ and $NoEr$, $NoEr$ and $NoDps$, $NoGth$ and $NoDps$, $\Delta\beta_{MKTRF}$ and $\Delta\beta_{SMB}$, and between $\Delta\beta_{MKTRF}$ and $\Delta\beta_{SMB}$. All other variables are not highly correlated with each other.

For each quarter, we run a cross-sectional regression. The full-sample regression model is as follows:

$$\begin{aligned} CAR_i = \beta_0 + \beta_1 LM12_i + \beta_2 Size_i + \beta_3 B/M_i + \beta_4 Error_i + \beta_5 \Delta Growth_i + \beta_6 \#Analyst_i \\ + \beta_7 Dispersion_i + \beta_8 LiqUp_i + \beta_9 LiqDown_i + \beta_{10} \Delta\sigma_i + \beta_{11} \Delta\beta_{MKTRF,i} \\ + \beta_{12} \Delta\beta_{SMB,i} + \beta_{13} \Delta\beta_{HML,i} + \beta_{14} NoGth_i + \beta_{15} NoEr_i + \beta_{16} NoDps_i + e_i \end{aligned} \quad (8)$$

In each quarter, we obtain an estimate of the coefficient for each variable and then compute the average estimate over our sample period. We calculate the average estimate based on two different methods. The first method is proposed by Fama and Macbeth (1973). The average estimate of a coefficient is the equal-weighted time-series average of all quarterly estimates. The T-statistics equals the time-series average over the standard error of the quarterly estimates. The second method is proposed by Litzenberger and Ramaswamy (1979). According to Litzenberger and Ramaswamy (1979), we give a different weight to each quarterly estimate when we calculate the average across all quarters. The weight is inversely proportional to the variance of the quarterly estimates. That is, we obtain the weighted average estimate, weighted variance, the weight, and the T-statistics according to the following equations:

$$\hat{\beta}_k = \sum_{t=1}^{T} Z_{kt}\hat{\beta}_{kt}, \tag{9}$$

$$\text{var}(\hat{\beta}_k) = \sum_{t=1}^{T} Z_{kt}^2 \text{var}(\hat{\beta}_{kt}), \tag{10}$$

$$Z_{kt} = \frac{\left(\text{var}(\hat{\beta}_{kt})\right)^{-1}}{\sum_{t=1}^{T}\left(\text{var}(\hat{\beta}_{kt})\right)^{-1}}, \tag{11}$$

$$T_k = \frac{\hat{\beta}_k}{\sqrt{\text{var}(\hat{\beta}_k)}}. \tag{12}$$

Easley, Hvidkjaer, and O'Hara (2002) argue that this method weights the coefficients by their precisions when summing across the cross-sectional regressions. Therefore, this correction technique is more efficient under time-varying volatility.

In Table 15, we show the regressions results. Panel A provides the average coefficients when the dependent variable is the cumulative abnormal return from the Fama-French 3-factor model during the period (0, 2). In Model (1), we do not include analysts' forecast

Table 15: Multivariate Regression

This table provides the results of multivariate regressions. In panel A the dependent variable is the cumulative abnormal return from Fama-French 3-factor model from day 0 to day 2. In panel B the dependent variable is the cumulative market-adjusted return from day 0 to day 2. The dependent variable is expressed in percentage. For each announcement during the period from July year t to June year $t+1$, the following independent variables are calculated: LM12 (LM12 estimated from July year $t-1$ to June year t), size (log market value (in millions) at the end of June at year t), B/M (log book-to-market ratio: book value from the annual report in year $t-1$ over market value at the end of Dec. year $t-1$), Error (analysts?forecast error over price in June year t, in percentage), ΔGrowth (difference in percentage between the analysts?growth forecasts right before and after the announcement, in percentage), # Analyst (number of analyst following), Dispersion (standard deviation of analysts?earnings forecasts), LiqUp (dummy variable which equals to 1 if liquidity is upgrade from June year t to June year $t+1$), LiqDown (dummy variable which equals to 1 if liquidity is downgrade from June, year t to June year $t+1$), $\Delta\beta_{MKTRF}$ (changes of systematic risk from (-40, -11) to (11,40)), $\Delta\beta_{SMB}$ (changes of sensitivity to SMB from (-40, -11) to (11,40)), $\Delta\beta_{HML}$ (changes of sensitivity to HML from (-40, -11) to (11,40)), $\Delta\sigma$ (changes of return volatility from (-40, -11) to (11,40), in percentage), NoEr (dummy which equals to 1 when analysts?forecast error is not available from I/B/E/S), NoGth (dummy which equals to 1 when long-term growth is not available from I/B/E/S), and Nodps (dummy which equals to 1 when forecast dispersion is not available from I/B/E/S). All results are estimated from Fama and Macbeth (1973) type regressions. In each regression model, two types of the estimates are calculated. The first estimates are calculated according to Fama and Macbeth (1973). The estimates are time-series averages of coefficients from all quarterly cross-sectional regressions. T-statistics (in parenthesis) is calculated from the ratio of the mean coefficient over 82 quarters to the standard errors of the 82 coefficients. The second estimates are computed according to Litzenberger and Ramaswamy (1979). The estimates are weighted means of the quarterly estimates, where the weights are inversely proportional to the variances of these estimates. In model (2), (3), (4), and (5), the third calendar quarter in 1984 is removed because it only has 12 non-missing observations when we exclude missing forecast error, forecast dispersion, and growth forecast.

Table 15 continued

Panel A: Regression of cumulative abnormal return from Fama and French 3-factor Model from day 0 to day 2

Model	(1)		(2)		(3)		(4)		(5)		(6)	
	F-M	L-R	F-M	L-R	F-M	L-R	F-M	L-R	F-M	L-R	F-M	L-R
Avg # OBS	2768	2768	1954	1954	1655	1655	1527	1527	1416	1416	2768	2768
Intercept	0.4130	0.3533	0.0141	-0.0051	-0.0099	-0.0073	-0.0933	-0.0847	0.1074	0.0775	0.6135	0.5912
	(3.40)	(4.50)	(0.09)	(-0.06)	(-0.06)	(-0.07)	(-0.56)	(-0.80)	(0.62)	(0.71)	(4.64)	(6.48)
LM12	**0.0084**	**0.0094**	**0.0071**	**0.0062**	**0.0095**	**0.0066**	**0.0101**	**0.0105**	**0.0074**	**0.0099**	**0.0081**	**0.0091**
	(6.70)	**(12.97)**	**(3.27)**	**(4.64)**	**(2.94)**	**(3.83)**	**(2.80)**	**(4.22)**	**(1.53)**	**(3.58)**	**(6.51)**	**(12.09)**
Size	-0.0606	-0.0531	0.027	0.0296	0.0387	0.0377	0.0565	0.0524	0.0275	0.0282	-0.0789	-0.0730
	(-3.00)	(-3.49)	(1.17)	(1.69)	(1.60)	(2.06)	(2.31)	(2.75)	(1.08)	(1.45)	(-3.90)	(-4.71)
B/M	0.2107	0.2255	0.1684	0.1872	0.1637	0.1612	0.1946	0.1855	0.1636	0.1557	0.2153	0.2267
	(5.89)	(9.89)	(3.89)	(7.36)	(4.38)	(5.90)	(5.19)	(6.60)	(4.17)	(5.33)	(6.23)	(9.89)
Error			0.0468	0.0019					0.2154	0.0052	0.0502	0.0020
			(4.33)	(6.35)					(4.57)	(4.20)	(4.00)	(4.89)
# Analyst	0.0346	0.0344	0.0084	0.0071	0.0023	0.0006	0.0015	-0.0009	0.0027	0.0002	0.0316	0.0308
	(5.9)	(6.22)	(1.37)	(1.22)	(0.37)	(0.10)	(0.23)	(-0.15)	(0.41)	(0.04)	(4.49)	(5.09)
Dispersion							-0.9446	-0.0261	-0.5807	-0.1205	-0.467	-0.021
							(-3.29)	(-1.41)	(-1.45)	(-2.63)	(-1.29)	(-0.82)
LiqUp	0.2017	0.1937	0.1684	0.1444	0.1207	0.0910	0.1450	0.139	0.1038	0.0909	0.1979	0.1915
	(3.01)	(4.32)	(2.58)	(3.03)	(1.94)	(1.81)	(2.21)	(2.66)	(1.57)	(1.70)	(2.96)	(4.27)
LiqDown	-0.1077	-0.1069	-0.0849	-0.0785	-0.0605	-0.0463	-0.0919	-0.0739	-0.0586	-0.0424	-0.1014	-0.1015
	(-2.07)	(-2.51)	(-1.41)	(-1.71)	(-1.14)	(-0.96)	(-1.64)	(-1.47)	(-1.04)	(-0.83)	(-1.94)	(-2.38)
$\Delta\beta_{MKTRF}$	0.1292	0.1407	0.1426	0.1661	0.1432	0.1602	0.1575	0.2035	0.1696	0.1987	0.1313	0.1416
	(3.00)	(12.16)	(2.67)	(11.19)	(2.38)	(9.53)	(2.42)	(11.38)	(2.60)	(10.51)	(3.06)	(12.24)
$\Delta\beta_{SMB}$	-0.0162	-0.0093	-0.0195	-0.0162	-0.0252	-0.0242	-0.0317	-0.0316	-0.0472	-0.0476	-0.0167	-0.0082
	(-0.51)	(-1.25)	(-0.53)	(-1.67)	(-0.66)	(-2.21)	(-0.86)	(-2.69)	(-1.29)	(-3.85)	(-0.53)	(-1.10)
$\Delta\beta_{HML}$	-0.0113	-0.0241	-0.0078	-0.0188	-0.0107	-0.0181	-0.0206	-0.0289	-0.0185	-0.0315	-0.0126	-0.0262
	(-0.40)	(-4.26)	(-0.28)	(-2.57)	(-0.32)	(-2.20)	(-0.60)	(-3.30)	(-0.53)	(-3.41)	(-0.45)	(-4.62)
ΔGrowth					0.1139	0.0891			0.1366	0.1113	0.0849	0.0915
					(7.63)	(10.23)			(8.09)	(11.2)	(2.71)	(9.18)
$\Delta\sigma$	-0.2272	-0.2316	-0.2477	-0.2565	-0.3052	-0.3047	-0.2841	-0.3029	-0.2818	-0.3026	-0.2230	-0.2275
	(-7.98)	(-23.87)	(-7.21)	(-18.44)	(-7.80)	(-18.92)	(-7.358)	(-17.58)	(-6.90)	(-16.52)	(-7.76)	(-23.42)
NoEr											0.146	0.2483
											(1.48)	(3.69)
NoDps											0.1020	-0.0842
											(-1.52)	(-1.38)
NoGth											-0.1386	-0.2800
											(-1.08)	(-4.20)
R^2	0.0241		0.0279		0.0244		0.0232		0.0326		0.0278	

Table 15 continued

Panel B: Regression of cumulative market-adjusted return from day 0 to day 2

Model	(1)		(2)		(3)		(4)		(5)		(6)	
	F-M	L-R	F-M	L-R	F-M	L-R	F-M	L-R	F-M	L-R	F-M	L-R
Avg # OBS	2768	2768	1954	1954	1655	1655	1527	1527	1416	1416	2768	2768
Intercept	0.3508	0.2762	-0.0117	-0.0362	-0.0068	-0.0255	-0.1003	-0.0907	0.1239	0.0732	0.549	0.5222
	(2.72)	(3.69)	(-0.06)	(-0.41)	(-0.03)	(-0.26)	(-0.46)	(-0.89)	(0.55)	(0.69)	(3.63)	(6.01)
LM12	**0.0073**	**0.0082**	**0.0058**	**0.0054**	**0.0076**	**0.0053**	**0.0086**	**0.0073**	**0.0057**	**0.0065**	**0.0072**	**0.0080**
	(6.06)	**(11.88)**	**(2.81)**	**(4.17)**	**(2.56)**	**(3.20)**	**(2.28)**	**(3.08)**	**(1.43)**	**(2.45)**	**(6.07)**	**(11.19)**
Size	-0.0553	-0.0435	0.0279	0.0313	0.0346	0.0359	0.0551	0.0518	0.0223	0.0266	-0.0734	-0.0631
	(-2.59)	(-3.00)	(0.95)	(1.86)	(1.07)	(2.03)	(1.61)	(2.82)	(0.63)	(1.42)	(-3.35)	(-4.28)
B/M	0.2223	0.2417	0.1879	0.2077	0.1690	0.1777	0.2045	0.2071	0.1656	0.1706	0.2234	0.2406
	(5.64)	(11.11)	(4.35)	(8.49)	(4.22)	(6.74)	(4.71)	(7.62)	(3.78)	(6.04)	(5.76)	(10.99)
Error			0.0406	0.0014					0.2128	0.0048	0.0438	0.0018
			(3.87)	(5.16)					(4.47)	(3.90)	(3.59)	(4.52)
# Analyst	0.0393	0.0356	0.0138	0.0089	0.0078	0.0030	0.0064	0.0007	0.0078	0.0015	0.0368	0.0309
	(6.34)	(6.74)	(1.94)	(1.59)	(1.05)	(0.54)	(0.81)	(0.12)	(0.99)	(0.25)	(5.20)	(5.34)
Dispersion							-0.7941	-0.0298	-0.3524	-0.0910	-0.3076	-0.0206
							(-2.59)	(-1.67)	(-0.86)	(-2.10)	(-0.86)	(-0.84)
LiqUp	0.2146	0.2029	0.1710	0.1491	0.1286	0.1068	0.1209	0.1206	0.0736	0.0755	0.2064	0.1970
	(3.10)	(4.76)	(2.61)	(3.26)	(2.04)	(2.21)	(1.74)	(2.40)	(1.06)	(1.46)	(3.00)	(4.62)
LiqDown	-0.1008	-0.1139	-0.1034	-0.1003	-0.0894	-0.0714	-0.1271	-0.0999	-0.1028	-0.0739	-0.0976	-0.1102
	(-1.96)	(-2.81)	(-1.74)	(-2.28)	(-1.74)	(-1.54)	(-2.32)	(-2.06)	(-1.80)	(-1.49)	(-1.92)	(-2.71)
$\Delta\beta_{MKTRF}$	0.1078	0.0743	0.1665	0.1210	0.1900	0.1309	0.2033	0.1612	0.2157	0.1625	0.1090	0.0751
	(3.89)	(6.75)	(4.33)	(8.48)	(4.44)	(8.06)	(4.38)	(9.32)	(4.56)	(8.89)	(3.90)	(6.82)
$\Delta\beta_{SMB}$	0.0308	0.0235	0.0245	0.0138	0.0171	0.0106	0.0073	0.0024	-0.0051	-0.0108	0.0306	0.0249
	(2.28)	(3.29)	(1.36)	(1.47)	(0.80)	(1.01)	(0.32)	(0.21)	(-0.23)	(-0.90)	(2.24)	(3.49)
$\Delta\beta_{HML}$	-0.0383	-0.0172	-0.0537	-0.0232	-0.0608	-0.0318	-0.0628	-0.0321	-0.0601	-0.0363	-0.0391	-0.0190
	(-2.93)	(-3.20)	(-3.43)	(-3.31)	(-2.96)	(-4.00)	(-2.92)	(-3.80)	(-2.80)	(-4.07)	(-2.97)	(-3.53)
ΔGrowth					0.1170	0.0905			0.1408	0.1156	0.0782	0.0939
					(7.63)	(10.71)			(8.03)	(11.94)	(1.90)	(9.80)
$\Delta\sigma$	-0.2378	-0.2396	-0.2869	-0.2852	-0.3579	-0.3524	-0.3292	-0.3431	-0.3311	-0.3502	-0.2327	-0.2355
	(-9.59)	(-25.82)	(-10.16)	(-21.28)	(-10.23)	(-22.65)	(-9.24)	(-20.58)	(-8.88)	(-19.76)	(-9.27)	(-25.36)
NoEr											0.1856	0.2219
											(2.33)	(3.46)
NoDps											-0.0534	-0.0759
											(-0.92)	(-1.30)
NoGth											-0.2408	-0.2838
											(-2.93)	(-4.46)
R^2	0.0119		0.0154		0.0141		0.0133		0.0237		0.0153	

errors, forecast dispersions, and changes of growth forecasts. In Model (2), Model (3), and Model (4), we add forecast errors, forecast dispersions, and changes of growth forecasts to the regression model, respectively. Model (5) includes the three variables in the regression but deletes announcements with any missing value in I/B/E/S. In Model (6), we report the estimates from the regression which includes all variables and announcements.

Examining the Fama-Macbeth estimates, we find that the T-statistics of the coefficients of LM12 are larger than 2 in all models except Model (5). Because the stocks in Model (5) are all quite liquid, and the T-statistics of the LM12 coefficient increases with the number of observations, we conjecture that the low variation of LM12 for stocks in Model (5) leads to the insignificant result.

Focusing on the Litzenberger-Ramaswamy weighted-average estimates, we find the estimates in all models are significant, including Model (5). The T-statistics of these estimates are all higher than 2. Because investor sentiment changes over time, if the coefficient of LM12 captures the effect of speculative trading, possibly the volatility of the estimates also changes over time. In this case, Litzenberger-Ramaswamy estimates can be more efficient because they consider time-varying volatility.

Our results indicate that after controlling for possible factors of the returns around quarterly earnings announcements, LM12 still have significant effects on the announcement returns. From Model (6) which includes all announcements in our sample, we find when the number of non-trading day increases by one day, the 3-day cumulative abnormal return increases by 0.0091%. In Table 1, the difference of average LM12 between the highest-LM12 decile and the lowest-LM12 decile is 112.83 days. Therefore, after controlling for other

possible factors, about 1.0268% premium is realized during the 3-day quarterly earnings announcement period and each year about 4.1070% is realized during the 12-day announcement period. In panel B of Table 15, we use the cumulative market-adjusted return from day 0 to day 2 as the dependent variable in the regressions. The results are quite similar to those in panel A. After controlling for other factors, each year about 3.6106% premium occurs during the 12-day quarterly earnings announcement period.

Following Brennan, Chordia, and Subrahmanyam (1998)[10], we also run a regression which expresses the explanatory variables for a given quarter as deviations from their cross-sectional means for that quarter. The results are presented in Table 16. Because in the regression, the coefficient of each explanatory variable captures the effect of a shock of one standard deviation from cross-sectional mean on the abnormal return, in panel A we first report the average of cross-sectional mean and standard deviation for each regression model. Generally speaking, when the average number of the observations in a regression model is larger, the cross-sectional mean and standard deviation of LM12 are larger.

Panel B of Table 16 shows the regression results when the dependent variable is the 3-day cumulative abnormal return from Fama and French 3-factor model. We find the coefficients of LM12 in all of the 6 regression models are significant positive. In Model (6) which includes all observations of our sample, the Litzenberger-Ramaswamy estimate is 0.2322. This means when the LM12 increases by one standard deviation from 11.49 to 38.57, the 3-day cumulative abnormal return from day 0 to day 2 increases by 0.2322%.

[10]In Brennan, Chordia, and Subrahmanyam's (1998) regression model, the dependent variable is the risk-adjusted return and the explanatory variables are non-risk firm characteristics. They argue that the regression model implies that the explanatory variables of the average security are zero and thus its expected return is determined solely by its risk characteristics.

Table 16: Robustness Check of Multivariate Regression

This table provides the results of multivariate regressions. All explanatory variables are expressed as the deviation from cross-sectional mean ((variable?mean)/standard deviation). We report the average of cross-sectional mean and standard deviation in Panel A. In panel B the dependent variable is the cumulative abnormal return from Fama-French 3-factor model from day 0 to day 2. In panel C the dependent variable is the cumulative market-adjusted return from day 0 to day 2. The dependent variable is expressed in percentage. For each announcement during the period from July year t to June year $t+1$, the following independent variables are calculated: LM12 (LM12 estimated from July year $t-1$ to June year t), size (log market value (in millions) at the end of June at year t), B/M (log book-to-market ratio: book value from the annual report in year $t-1$ over market value at the end of Dec. year $t-1$), Error (analysts?forecast error over price in June year t, in percentage), ΔGrowth (difference in percentage between the analysts?growth forecasts right before and after the announcement, in percentage), # Analyst (number of analyst following), Dispersion (standard deviation of analysts?earnings forecasts), LiqUp (dummy variable which equals to 1 if liquidity is upgrade from June year t to June year $t+1$), LiqDown (dummy variable which equals to 1 if liquidity is downgrade from June, year t to June year $t+1$), $\Delta\beta_{MKTRF}$ (changes of systematic risk from (-40, -11) to (11,40)), $\Delta\beta_{SMB}$ (changes of sensitivity to SMB from (-40, -11) to (11,40)), $\Delta\beta_{HML}$ (changes of sensitivity to HML from (-40, -11) to (11,40)), $\Delta\sigma$ (changes of return volatility from (-40, -11) to (11,40), in percentage), NoEr (dummy which equals to 1 when analysts?forecast error is not available from I/B/E/S), NoGth (dummy which equals to 1 when long-term growth is not available from I/B/E/S), and Nodps (dummy which equals to 1 when forecast dispersion is not available from I/B/E/S). All results are estimated from Fama and Macbeth (1973) type regressions. In each regression model, two types of the estimates are calculated. The first estimates are calculated according to Fama and Macbeth (1973). The estimates are time-series averages of coefficients from all quarterly cross-sectional regressions. T-statistics (in parenthesis) is calculated from the ratio of the mean coefficient over 82 quarters to the standard errors of the 82 coefficients. The second estimates are computed according to Litzenberger and Ramaswamy (1979). The estimates are weighted means of the quarterly estimates, where the weights are inversely proportional to the variances of these estimates. In model (2), (3), (4), and (5), the third calendar quarter in 1984 is removed because it only has 12 non-missing observations when we exclude missing forecast error, forecast dispersion, and growth forecast.

Panel A: Average cross-sectional mean and standard deviation

Model	(1)		(2)		(3)		(4)		(5)		(6)	
	Mean	Standard deviation	Mean	Standard deviation	Mean	Standard deviation	Mean	Standard deviation	Mean	Standard deviation	Mean	Standard deviation
Avg # OBS	2768	2768	1954	1954	1655	1655	1527	1527	1416	1416	2768	2768
LM12	**11.4905**	**27.08**	**4.4093**	**14.23**	**3.0685**	**11.03**	**1.9344**	**7.91**	**1.6617**	**7.06**	**11.4905**	**27.08**
Size	5.3057	1.85	5.9018	1.69	6.1555	1.63	6.3322	1.59	6.4299	1.57	5.3057	1.85
B/M	-0.5527	0.82	-0.6682	0.77	-0.6903	0.75	-0.7322	0.76	-0.7341	0.75	-0.5527	0.82
Error			-0.8834	32.28					-0.3688	10.93	-0.6111	26.73
# Analyst	3.5719	4.57	5.1687	4.75	5.7966	4.87	6.3842	4.75	6.6453	4.8	3.5719	4.57
Dispersion							0.0446	0.49	0.0399	0.33	0.0239	0.37
LiqUp	0.2275	0.42	0.2339	0.42	0.2282	0.41	0.2288	0.41	0.2248	0.41	0.2275	0.42
LiqDown	0.2942	0.45	0.2856	0.44	0.2801	0.43	0.2711	0.43	0.2702	0.42	0.2942	0.45
$\Delta\beta_{MKTRF}$	-0.011	2.33	-0.0125	1.95	-0.0129	1.82	-0.0129	1.77	-0.012	1.72	-0.011	2.33
$\Delta\beta_{SMB}$	0.0019	3.06	0.0013	2.54	0.0001	2.37	0.0025	2.29	0.0034	2.22	0.0019	3.06
$\Delta\beta_{HML}$	-0.0053	3.84	-0.0066	3.2	-0.0061	2.95	-0.0035	2.88	-0.0021	2.79	-0.0053	3.84
ΔGrowth					-0.1017	2.13			-0.1104	1.99	-0.0602	1.62
$\Delta\sigma$	-0.0304	1.87	-0.0544	1.42	-0.06193	1.29	-0.0654	1.25	-0.0688	1.21	-0.0304	1.87
NoEr											0.3078	0.45
NoDps											0.4667	0.49
NoGth											0.4074	0.48

Table 16 continued

Panel B: Regression of cumulative abnormal return from Fama and French 3-factor Model from day 0 to day 2

Model	(1)		(2)		(3)		(4)		(5)		(6)	
	F-M	L-R	F-M	L-R	F-M	L-R	F-M	L-R	F-M	L-R	F-M	L-R
Avg # OBS	2768	2768	1954	1954	1655	1655	1527	1527	1416	1416	2768	2768
Intercept	0.1981	0.1728	0.1186	0.0941	0.1522	0.1273	0.1267	0.1031	0.1511	0.1239	0.1981	0.1724
	(6.73)	(10.02)	(3.66)	(5.11)	(4.77)	(6.63)	(3.99)	(5.18)	(4.79)	(6.12)	(6.73)	(10.02)
LM12	**0.2461**	**0.2409**	**0.1017**	**0.0881**	**0.1005**	**0.0758**	**0.0885**	**0.0810**	**0.0738**	**0.0652**	**0.2380**	**0.2322**
	(7.36)	**(12.06)**	**(3.74)**	**(4.38)**	**(3.32)**	**(3.67)**	**(3.85)**	**(3.82)**	**(2.79)**	**(3.03)**	**(7.14)**	**(11.27)**
Size	-0.1139	-0.0959	0.0455	0.0497	0.0634	0.0608	0.0921	0.0806	0.0437	0.0429	-0.1480	-0.1320
	(-3.06)	(-3.44)	(1.16)	(1.69)	(1.56)	(2.04)	(2.33)	(2.68)	(1.07)	(1.42)	(-3.96)	(-4.65)
B/M	0.1883	0.1678	0.1431	0.1304	0.1290	0.1123	0.1545	0.1297	0.1275	0.1078	0.1904	0.1700
	(6.05)	(9.11)	(4.19)	(6.77)	(4.32)	(5.60)	(5.21)	(6.24)	(4.16)	(5.07)	(6.34)	(9.18)
Error			0.8040	0.2790					0.5825	0.3271	0.2326	0.2358
			(5.70)	(14.93)					(4.13)	(13.93)	(5.30)	(12.87)
# Analyst	0.1645	0.1508	0.0451	0.0313	0.0170	0.0014	0.0077	-0.0012	0.0152	0.0005	0.1474	0.1369
	(6.01)	(5.89)	(1.57)	(1.13)	(0.56)	(0.05)	(0.24)	(-0.04)	(0.48)	(0.02)	(4.67)	(4.83)
Dispersion							-0.1070	-0.1046	0.0780	-0.0788	-0.0452	-0.0452
							(-3.78)	(-5.17)	(0.57)	(-3.34)	(-1.80)	(-2.41)
LiqUp	0.0854	0.0793	0.0720	0.0590	0.0494	0.0376	0.0606	0.0555	0.0422	0.0361	0.0838	0.0785
	(3.12)	(4.25)	(2.70)	(2.96)	(2.02)	(1.81)	(2.32)	(2.58)	(1.63)	(1.65)	(3.08)	(4.20)
LiqDown	-0.0451	-0.0513	-0.0345	-0.0382	-0.0222	-0.0239	-0.0368	-0.0351	-0.0230	-0.0209	-0.0423	-0.0487
	(-1.94)	(-2.68)	(-1.32)	(-1.89)	(-0.97)	(-1.14)	(-1.54)	(-1.63)	(-0.97)	(-0.96)	(-1.82)	(-2.55)
$\Delta\beta_{MKTRF}$	0.3009	0.3295	0.2824	0.3240	0.2637	0.2891	0.2972	0.3537	0.2960	0.3401	0.3054	0.3313
	(3.12)	(12.10)	(2.97)	(11.21)	(2.73)	(9.53)	(2.87)	(11.24)	(2.98)	(10.59)	(3.18)	(12.17)
$\Delta\beta_{SMB}$	-0.0515	-0.0148	-0.0369	-0.0203	-0.0713	-0.0336	-0.0803	-0.0483	-0.1134	-0.0812	-0.0524	-0.0125
	(-0.64)	(-0.63)	(-0.39)	(-0.82)	(-0.94)	(-1.29)	(-1.13)	(-1.78)	(-1.63)	(-2.94)	(-0.65)	(-0.53)
$\Delta\beta_{HML}$	-0.0597	-0.0808	-0.0431	-0.0460	-0.0433	-0.0404	-0.0744	-0.0618	-0.0641	-0.0674	-0.0649	-0.0879
	(-0.59)	(-3.53)	(-0.50)	(-1.91)	(-0.46)	(-1.61)	(-0.78)	(-2.38)	(-0.67)	(-2.55)	(-0.64)	(-3.84)
ΔGrowth					0.2270	0.1991			0.2595	0.2259	0.1685	0.1564
					(7.51)	(10.29)			(8.08)	(11.03)	(7.22)	(9.04)
$\Delta\sigma$	-0.4270	-0.3997	-0.3505	-0.3400	-0.3936	-0.3637	-0.3652	-0.3442	-0.3578	-0.3253	-0.4195	-0.3925
	(-8.26)	(-22.51)	(-7.71)	(-17.73)	(-7.68)	(-18.13)	(-7.28)	(-16.49)	(-6.73)	(-15.22)	(-8.07)	(-22.08)
NoEr											0.0797	0.1110
											(1.98)	(3.63)
NoDps											-0.0382	-0.0420
											(-1.32)	(-1.39)
NoGth											-0.1028	-0.1341
											(-2.48)	(-4.12)
R^2	0.0241		0.0279		0.0244		0.0232		0.0326		0.0278	

Table 16 continued

Panel C: Regression of cumulative market-adjusted return from day 0 to day 2

Model	(1)		(2)		(3)		(4)		(5)		(6)	
	F-M	L-R	F-M	L-R	F-M	L-R	F-M	L-R	F-M	L-R	F-M	L-R
Avg # OBS	2768	2768	1954	1954	1654	1654	1527	1527	1417	1417	2768	2768
Intercept	0.1837	0.1414	0.1258	0.0837	0.1637	0.1201	0.1438	0.0979	0.1695	0.1186	0.1837	0.1410
	(4.40)	(8.61)	(2.88)	(4.74)	(3.66)	(6.49)	(3.19)	(5.11)	(3.72)	(6.08)	(4.40)	(8.60)
LM12	**0.2162**	**0.2099**	**0.0840**	**0.0763**	**0.0782**	**0.0601**	**0.0699**	**0.0571**	**0.0519**	**0.0406**	**0.2118**	**0.2041**
	(6.59)	**(11.04)**	**(3.28)**	**(3.95)**	**(2.88)**	**(3.02)**	**(3.23)**	**(2.79)**	**(2.35)**	**(1.96)**	**(6.67)**	**(10.41)**
Size	-0.1043	-0.0780	0.0471	0.0526	0.0565	0.0579	0.0885	0.0801	0.0342	0.0412	-0.1382	-0.1135
	(-2.63)	(-2.94)	(0.94)	(1.87)	(1.05)	(2.01)	(1.62)	(2.77)	(0.61)	(1.41)	(-3.38)	(-4.20)
B/M	0.2001	0.1777	0.1609	0.1421	0.1367	0.1201	0.1673	0.1401	0.1338	0.1136	0.1997	0.1780
	(5.66)	(10.14)	(4.39)	(7.69)	(4.01)	(6.23)	(4.51)	(6.99)	(3.64)	(5.54)	(5.76)	(10.09)
Error			0.2516	0.2429					0.5783	0.2961	0.2108	0.2068
			(5.56)	(13.54)					(4.20)	(13.08)	(5.13)	(11.85)
# Analyst	0.1835	0.1584	0.0652	0.0443	0.0382	0.0179	0.0269	0.0095	0.0352	0.0118	0.1622	0.1414
	(6.33)	(6.50)	(1.96)	(1.66)	(1.07)	(0.65)	(0.74)	(0.34)	(0.95)	(0.42)	(5.36)	(5.23)
Dispersion							-0.0865	-0.0898	0.1122	-0.0566	-0.0269	-0.0312
							(-2.94)	(-4.60)	(0.85)	(-2.49)	(-1.05)	(-1.75)
LiqUp	0.0908	0.0827	0.0734	0.0602	0.0536	0.0426	0.0514	0.0464	0.0309	0.0280	0.0874	0.0803
	(3.23)	(4.66)	(2.74)	(3.15)	(2.13)	(2.14)	(1.83)	(2.24)	(1.12)	(1.53)	(3.13)	(4.51)
LiqDown	-0.0426	-0.0540	-0.0435	-0.0472	-0.0352	-0.0342	-0.0511	-0.0463	-0.0414	-0.0338	-0.0412	-0.0523
	(-1.86)	(-2.97)	(-1.69)	(-2.43)	(-1.57)	(-1.70)	(-2.15)	(-2.23)	(-1.70)	(-1.60)	(-1.82)	(-2.87)
$\Delta\beta_{MKTRF}$	0.2200	0.2055	0.2826	0.2670	0.2948	0.2666	0.3136	0.3135	0.3192	0.3071	0.2228	0.2072
	(3.61)	(7.90)	(4.10)	(9.59)	(4.24)	(9.09)	(4.31)	(10.29)	(4.42)	(9.87)	(3.62)	(7.97)
$\Delta\beta_{SMB}$	0.0748	0.0904	0.0372	0.0517	0.0240	0.0444	0.0065	0.0231	-0.0230	-0.0067	0.0755	0.0935
	(1.88)	(4.05)	(0.90)	(2.15)	(0.55)	(1.76)	(0.15)	(0.88)	(-0.52)	(-0.25)	(1.80)	(4.19)
$\Delta\beta_{HML}$	-0.1351	-0.0772	-0.1678	-0.0770	-0.1776	-0.0920	-0.1758	-0.0918	-0.1660	-0.0963	-0.1391	-0.0829
	(-2.68)	(-3.55)	(-3.52)	(-3.33)	(-3.05)	(-3.81)	(-3.04)	(-3.66)	(-2.89)	(-3.78)	(-2.73)	(-3.81)
ΔGrowth					0.2340	0.2011			0.2697	0.2316	0.1740	0.1591
					(7.39)	(10.79)			(7.82)	(11.74)	(7.07)	(9.66)
$\Delta\sigma$	-0.4497	-0.4109	-0.4111	-0.3745	-0.4739	-0.4119	-0.4331	-0.3824	-0.4303	-0.3683	-0.4414	-0.4036
	(-9.48)	(-24.31)	(-9.71)	(-20.34)	(-9.72)	(-21.31)	(-8.86)	(-18.99)	(-8.39)	(-17.88)	(-9.22)	(-23.85)
NoEr											0.0798	0.1007
											(2.19)	(3.46)
NoDps											-0.0309	-0.0373
											(-1.10)	(-1.29)
NoGth											-0.1163	-0.1370
											(-2.90)	(-4.41)
R^2	0.0119		0.0154		0.0141		0.0133		0.0237		0.0153	

Because the difference of LM12 between high-LM12 and low-LM12 stocks is 112.83 (about 4.17 standard deviations), for each quarterly announcement the 3-day abnormal return of high-LM12 stocks is estimated to be higher by 0.9674% than low-LM12 stocks. Each year, the perceived liquidity premium realized around the 12-day announcement period is about 3.8699%, which is quite close to the magnitude in Table 15.

In Model (5) of panel B, although the estimate of the LM12 coefficient are very different from that in Model (6), because the cross-sectional standard deviation of LM12 in Model (5) is lower, the economic effect of LM12 in Model (5) is similar to that in Model (6). The average cross-sectional standard deviation of LM12 in Model (5) is 7.06. When the LM12 increases by 7.06, the 3-day abnormal return increases by 0.0652%. The difference of 112.83 between liquid and illiquid stocks is about 15.98 standard deviations. Therefore, from Model (5), the premium realized during the 3-day announcement period is about 1.0420% per quarter or 4.1680% per year.

In panel C of Table 16, we provide the results when the dependent variable is the 3-day market-adjusted return. The effect of LM12 on the event-day return is not as strong as the effect in panel B. In model (6), when the LM12 increases by 27.08, the 3-day abnormal return increases by 0.2041%. In model (5), when the LM12 increases by 7.06, the 3-day abnormal return increases by 0.0406%. This implies that the liquidity premium realized during the 12-day announcement period is 3.4016% in Model (6) and 2.5954% in Model (5).

To sum up, the magnitude of the perceived liquidity premium realized during quarterly earnings announcement periods is not trivial. If we focus on Model (6) of Table 15 and use

the abnormal return from Fama-French 3-factor model as the dependent variable, we find the liquidity premiums realized during the 12-day announcement period is about 4.11%, which is around one-third annual liquidity premium. Because it is hard to explain why there is a non-trivial liquidity premium realized during the 12-day quarterly announcement period after controlling for possible factors, we believe it reflects the adjustment of mispricing after quarterly earnings announcements by overconfident investors. Our results support the third hypothesis that the perceived liquidity premium is partially driven by the speculative trading of overconfident investors.

Chapter 6 Conclusion

This study investigates whether stock price reactions to quarterly earnings announcements depend on stock liquidity. Our hypotheses are derived from Baker and Stein (2004) and Scheinkman and Xiong (2003). With differences in beliefs from overconfident investors and short-sale constraints, the liquidity of stocks is magnified by speculative trading of optimistic overconfident investors. Thus, liquid stocks tend to be more overpriced than illiquid stocks. We hypothesize that quarterly earnings announcements convey information about firms' fundamental values, which triggers and synchronizes investors' revisions of their mispricing. Therefore, right after the quarterly earnings announcements, liquid stocks which contain a larger speculative component in their prices prior to the announcements should show a lower abnormal return than illiquid stocks.

Investigating the return and trading activities around quarterly earnings announcement, we find evidences support our hypothesis. The abnormal returns right after quarterly earnings announcements decrease with the liquidity of the stock. The differences of cumulative abnormal returns between the most liquid stocks and the least liquid stocks is 1.91% during the 3-day period from day 0 to day 2. This difference is robust after we control for firm size, book-to-market, earnings forecast errors, revisions of growth forecasts, analyst forecasts dispersions, changes of return volatility, changes of future liquidity, and for changes in risk.

From the abnormal trading volume and the path of cumulative abnormal returns during the announcement period, we find evidence of speculative trading for liquid stocks

prior to the announcements. Before the announcement, the trading volume decreases and the drop in volume decreases with the increase in liquidity. The cumulative abnormal returns of liquid stocks increase significantly prior to the announcements but decrease significantly after the announcements. Because we do not observe the same return pattern for illiquid stocks and the volume drop prior to the announcements for liquid stocks is lower than illiquid stocks, the result indicates that before the announcements, speculative trading occurs more frequently for liquid stocks than for illiquid stocks. This pattern of speculative trading holds particularly for small, growth, high-forecast-dispersion, low-analyst-following stocks whose valuation tend to be subjective, which also supports Baker and Wurgler (2006).

In the further analysis of the different announcement effects on liquid and illiquid stocks, we find liquidity premium realized during the 12-day period right after quarterly earnings announcements is 5.54%. It is about 45.6% of the perceived annual liquidity premium. After controlling other factors in a regression, we still find about 4.11% liquidity premium per year occurs during the quarterly earnings announcements. The magnitude is not trivial. These results support our hypothesis that liquidity premium can be partially explained by the speculative trading from overconfident investors. They also suggest that earnings announcements can serve as an important mechanism for regulating overpricing caused by speculative trading.

Our findings contribute to the debate on whether investors' behavior affects stock prices. The effect of investors' speculative trading on stock prices is not negligible. Given the excessive trading activities on the stock market and the sizable liquidity premium

per year, we believe there is a non-trivial component of stock prices resulted from non-fundamental non-risk factors. Thus, for future research, incorporating investors' sentiment or speculative behavior into an asset pricing model and identifying the magnitude of irrational investors' influence on stock prices are promising research areas.

References

Abreu, D. and M.K. Brunnermeier, 2003. "Bubbles and Crashes," *Econometrica*, Vol. 71, No. 1, pp. 173-204.

Acharya, V.V., and L.H. Pedersen, 2005. "Asset pricing with liquidity risk," *Journal of Financial Economics*, 77, pp. 375-410.

Admati, A., and P. Pfleiderer, 1988. "A theory of intraday patterns: Volume and price variability," *Review of Financial Studies*, 1, pp. 3-40.

Amihud, Y., 2002. "Illiquidity and stock returns," *Journal of Financial Markets*, 5, pp. 31-56.

Amihud, Y. and H. Mendelson, 1986. "Asset pricing and the bid-ask spread," *Journal of Financial Economics*, 17, pp. 223-249.

Atiase, R.K., 1985. "Predisclosure information, firm capitalization, and security price behavior around earnings announcements ," *Journal of Accounting Research*, Vol. 23, No. 1 , pp. 21-36.

Atkins, A.B., and E.A. Dyl, 1997. "Market Structure and Reported Trading Volume: NASDAQ versus the NYSE," *Journal of Financial Research*, Vol. XX, No. 3, pp. 291-304.

Baker, M. and J. Stein, 2004. "Market liquidity as a sentiment indicator," *Journal of Financial Markets*, 7, pp. 271-299.

Baker, M. and J. Wurgler, 2006. "Investor sentiment and the cross-section of stock returns," *Journal of Finance*, 61, pp. 1645-1680.

Black, F., 1986. "Noise," *Journal of Finance*, Vol. XLI, No. 3, pp. 529-543.

Brennan, M.J., T. Chordia, and A. Subrahmanyam, 1998. "Alternative factor specifications, security characteristics, and the cross-section of expected stock returns," *Journal of Financial Economics*, 49, pp. 345-373.

Brennan, M.J. and A. Subrahmanyam, 1996. "Market microstructure and asset pricing: On the compensation for illiquidity in stock returns," *Journal of Financial Economics*, 41, pp. 441-464.

Brown, G.W. and M.T. Cliff, 2005. "Investor sentiment and asset valuation," *Journal of Business*, Vol. 78, No. 2, pp. 405-440.

Campbell, J.Y. and A.S. Kyle, 1993. "Smart money, noise trading and stock price behaviour," *Review of Economic Studies*, 60, pp. 1-34.

Chae, J, 2005. "Trading Volume, Information Asymmetry, and Timing Information," *Journal of Finance*, Vol. LX, No. 1, pp. 413-442.

Datar, V., N.Y. Naik, and R. Radcliffe, 1998. "Liquidity and stock returns: An alternative test," *Journal of Financial Markets*, 1, pp. 203-219.

Diether, K.B., C.J. Malloy, and A. Scherbina, 2002. "Differences of opinion and the cross section of stock returns," *Journal of Finance*, 57, pp. 2113-2141.

Easley, D. and M. O'Hara, 1992."Adverse selection and large trade volume: The implications for market efficiency," *Journal of Financial and Quantitative Analysis*, Vol. 27, pp185-208.

Easley, D., S. Hvidkjaer, and M. O'Hara, 2002."Is information risk a determinant of asset returns?," *Journal of Finance*, Vol. 57, pp2185-2221.

Fama, E.F., and K.R. French, 1993. "Common risk factors in the returns on stocks and bonds," *Journal of Financial Economics*, 33, pp. 3-56.

Fama, E.F., and J. Macbeth, 1973. "Risk, return, and equilibrium: Empirical tests," *Journal of Political Economics*, 71, pp.607-636.

Frazzini, A., and O. Lamont, 2006. "The earnings announcement premium and trading volume," working paper, University of Chicago.

Glaser, M., and M. Weber, 2003. "Overconfidence and trading volume," working paper, University Mannheim.

Hong, H., T. Lim, and J. Stein, 2000. "Bad news travels slowly: Size, analyst coverage and the profitability of momentum strategies," *Journal of Finance*, 55, pp. 265-296.

Johnson, S., A.Y.C. Lei, J. Lin, and G.C. Sanger, 2006. "Trading volume trend, investor sentiment, and stock returns," *working paper*, Louisiana State University.

Kim, O. and R.E. Verrecchia, 1991. "Market reaction to anticipated announcements," *Journal of Financial Economics*, 30, pp. 273-309.

Krinsky, I. and J. Lee, 1996. "Earnings announcements and the components of the bid-ask spread," *Journal of Finance*, Vol. LI, No. 4, pp. 1523-1535.

Kumar, A. and C. Lee, 2006. "Retail investor sentiment and return comovements," *Journal of Finance*, Vol. 61, No. 5, pp. 2451-2486.

La Porta, R., 1996. "Expectations and the cross-section of stock returns," *Journal of Finance*, Vol. LI, No. 5, pp. 1715-1742.

La Porta, R., J. Lakonishok, A. Shleifer, and R. Vishny, 1997. "Good news for value stocks: Further evidence on market efficiency," *Journal of Finance*, Vol. 52, No. 2, pp. 859-874.

Lee, C., 1992. "Earnings news and small traders," *Journal of Accounting & Economics*, Vol. 15, pp. 265-302.

Lee, C., B. Mucklow, and M.J. Ready, 1993. "Spreads, depths, and the impact of earnings information: An intraday analysis," *Review of Financial Studies*, Vol. 6, pp. 345-374.

Lee, C. and B. Swaminathan, 2000. "Price Momentum and Trading Volume," *Journal of Finance*, Vol. LV, No. 5, pp. 2017-2069.

Lesmond, D.A., J.P. Ogden, and C.A. Trzcinka, 1999. "A new estimate of transaction costs," *Review of Financial Studies*, Vol. 12, No. 5, pp. 1113-1141.

Litzenberger, R.H. and K. Ramaswamy, 1979. "The effect of personal taxes and dividends on capital asset prices," *Journal of Financial Economics*, 7, pp. 163-195.

Liu, W., 2006. "A liquidity-augmented capital asset pricing model," *Journal of Financial Economics*, 82, pp. 631-671.

Mei, J., J.A. Scheinkman, and W. Xiong, 2004. "Speculative trading and stock prices: An analysis of Chinese A-B share premia," working paper, Princeton University.

Miller, E., 1977. "Risk, uncertainty, and divergence of opinion," *Journal of Finance*, 32, pp. 1151-1168.

Neal, R. and S. Wheatley, 1998. "Do measures of investor sentiment predict returns?" *Journal of Financial and Quantitative Analysis*, Vol. 33, No. 4, pp. 523-547.

Odean, T., 1998. "Volume, volatility, price, and profit when all traders are above average," *Journal of Finance*, Vol. LIII, No. 6, pp. 1887-1934.

Odean, T., 1999. "Do investors trade too much?" *American Economic Review*, Vol. 89, No. 5, pp. 1279-1298.

Ofek, E., and M. Richardson, 2003. "The rise and fall of internet stock prices," *Journal of Finance*, Vol. 58, No. 3, pp. 1113-1138.

Pastor, L. and R.F. Stambaugh, 2003. "Liquidity risk and expected stock returns," *Journal of Political Economy*, Vol. 111, No. 3, pp. 642-685.

Piqueira, N.S., 2006. 'Trading activity, illiquidity costs and stock returns'," working paper, University of Houston.

Scheinkman, J. and W. Xiong, 2003. "Overconfidence and Speculative Bubbles," *Journal of Political Economy*, Vol. 111, No. 6, pp. 1183-1220.

Shleifer, A. and R. Vishny, 1997. "The limits of arbitrage," *Journal of Finance*, 52, pp. 35-55.

Statman, M., S. Thorley, and K. Vorkink, 2006. "Investor overconfidence and trading volume," *Review of Financial Studies*, Vol. 19, No. 4, pp. 1531-1565.

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